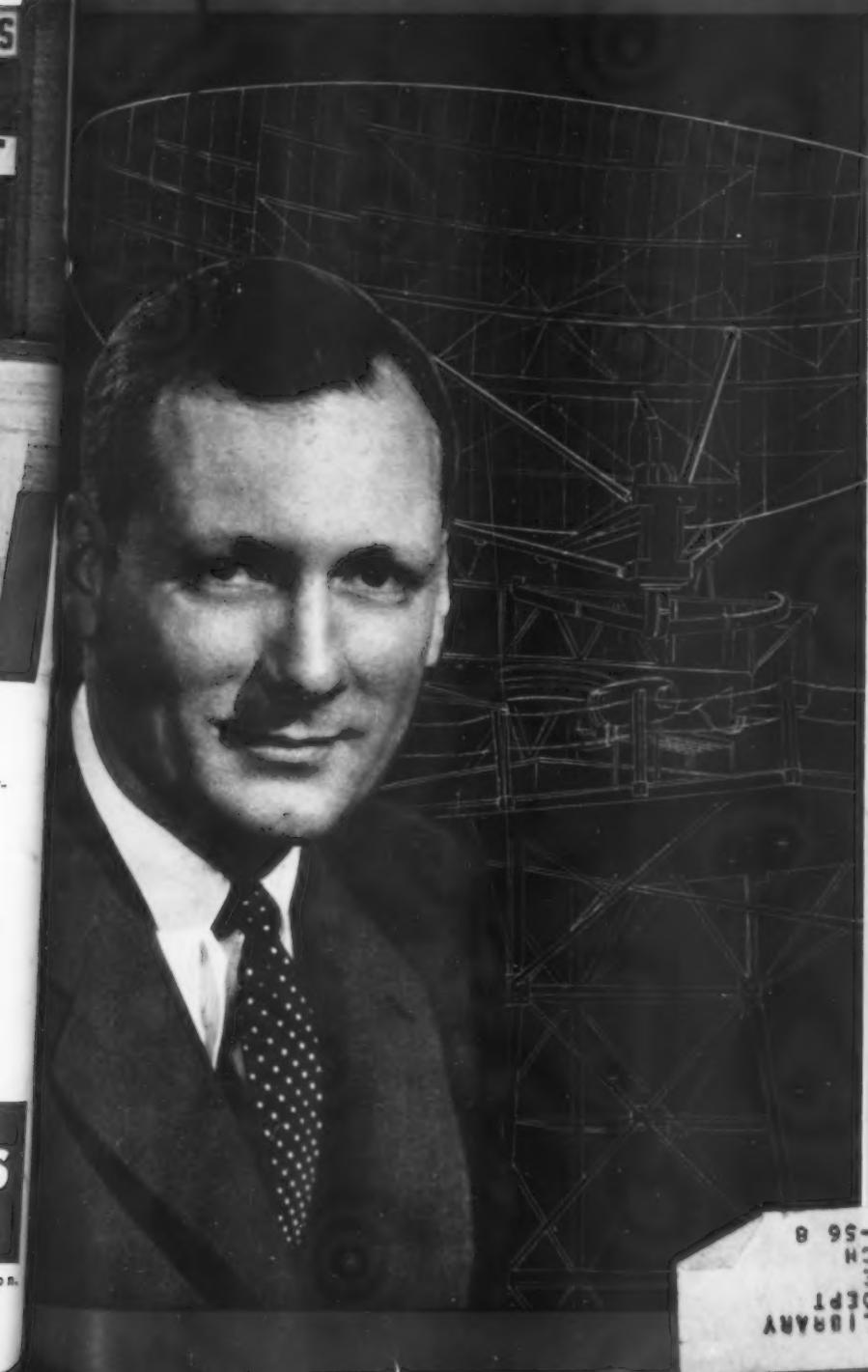


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AIRTRENDS for 1954

Washington, D. C. . . . January 4, 1954

Here's what the aircraft industry can expect for 1954:

Military production will continue at present rate of about 1000 planes per month for first half of '54, with gradual tapering off after mid-year. By end of year production rate will be substantially below current level.

Employment, which reached peak of about 750,000 recently, will start downward.

Sales will stay near estimated 1953 level of \$9 billion despite reduction in number of aircraft produced because of heavier, more complex aircraft involved and general rising prices.

Net profits should also increase with elimination of excess profits tax and scheduled April cut in general taxes. Tightening Pentagon policies might still leave planebuilders with little more than historic two to three per cent return on sales.

Backlogs, currently at more than \$18 billion, will go down as new orders fall off. Subcontractors, who started to feel squeeze in 1953 as work was pulled back into own plants by subcontractors, face more of the same.

Equipment-wise, 1954 will see end of production of last U. S. piston-engine bomber, the Convair B-36. Production of first supersonic fighter, the North American F-100, will be supplemented by McDonnell F-101 and Convair F-102. First deliveries of production model Boeing B-52's are scheduled. First U. S. commercial jet transport prototype, the Boeing 707, will make first flight. USAF will take delivery on three new prototype turboprop transports: Convair's 340 with Allison T56's, Lockheed's Super Constellation with Pratt & Whitney T34's, and Boeing's C-97 with T34's.

Airlines are cautious in predicting 1954 traffic. Outlook seems to be for passenger-mile increase between 5% and 10%—against 1953's jump of more than 17% over 1952.

Here's how predictions are running: Air Transport Association sees "some evidence" that the 1954 rate of increase may be smaller than 1953; last-half traffic didn't maintain same favorable rate of increase as in first six months of 1953. American Airlines expects 5% to 10% jump in passenger-miles and revenues; TWA says first six months may be eight per cent ahead (domestic and international) in passenger-miles, five to six per cent ahead in revenues. Capital notes that the "economic climate is such that no substantial traffic growth is anticipated for 1954." Eastern is somewhat more optimistic than the others.

Leveling off of business and addition of new and larger equipment is expected to result in lower '54 load factors. With larger percentage of traffic in coach operations airlines are operating in a profit area sensitive to minor fluctuations.

Expense trend is still upward. In 1953, domestic trunks' expense increase out-

ran revenue gain (16.4% vs. 14%), reducing net operating income 3.3% below that of 1952.

Mail rates, subsidy, mergers, airfreight, and internal organizational problems will highlight CAB activities in 1954.

Complete revamping of the service mail rate structure could be biggest single item of the year. Subsidy problem will be met early as CAB goes before Congressional Appropriation Committees.

Colonial-Eastern merger should be decided soon, but far-reaching implications are involved in Pioneer-Continental-Braniff case, where issue of merging local service lines into trunks will be met for first time.

Five-year all-cargo line experiment ends in August. Major economic proceeding will tell whether it should be repeated. Also, omnibus freight forwarder case will shed new light on auxiliary freight services.

With organization-minded Chan Gurney as chairman, internal CAB friction should be lessened. Also, industry can look for increasingly better staff thinking as new staffers Sawyer, FitzGerald, and Griffith continue to impress.

Prospects for international aviation this year are healthy. Extension of tourist service round the world should bring increased traffic on many of the less important routes. Biggest boom is likely in the Pacific, where the tourist fare (at 25% reduction from the first-class rate) comes into effect on April 1.

During the latter part of 1954 Comet II's will come into operation, bringing jet transports to South America. Viscount deliveries will be made to several operators including Trans-Canada Air Lines and Trans-Australia Airlines. Production of Britain's third turbine transport, the Bristol Britannia, should enable initial deliveries to be made by the end of the year.

Japan Air Lines will start international operations early in 1954 whereas Germany's revived Lufthansa airline should get going during the year.

Safety record of scheduled airlines continued its upswing. The combined U. S. domestic and international carriers achieved a rate of 0.48 passenger fatalities per 100 million passenger-miles, compared with 0.9 in 1952 and 1.3 in 1951.

Performance of international carriers improved from a 3.1 fatality rate in 1952 to 0.06 in 1953. These carriers completed a full year of fatality-free operation on August 28 for the eighth time in their history.

Domestic airline rate was up 0.21, moving from 0.37 fatalities in 1952 to 0.58 in 1953.

Large irregular carriers suffered their third highest fatality rate since 1946, closing the year with an estimated 10.6 deaths per 100 million passenger-miles.

Business aircraft operators can expect to get first look at four specific aircraft design proposals fitted to their requirements during the year. Despite reports that lack of proper statistics are blocking manufacturer interest, these manufacturers are going ahead with proposals to meet specifications of National Business Aircraft Association after their own surveys establish nature of the market.



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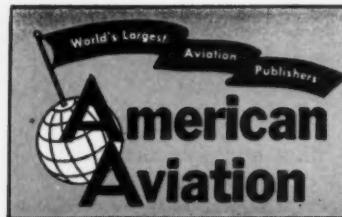
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January 4, 1954

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General Manager: Leonard Eiserer

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Circulation Promotion Mgr.: Larry Brettner

Circulation Service Mgr.: Geneva C. Kinnaird

American Aviation is published every other Monday by American Aviation Publications, Inc., Washington, D. C. Printed at The Telegraph Press, Harrisburg, Pa. Subscription rates for United States, Canada, Mexico, Central and South America, \$1.00 for 1 year; \$5.00 for 2 years. All other countries—\$7.00 for 1 year; \$12.00 for 2 years. Entered as Second-Class matter in Washington, D. C., and Harrisburg, Pa.

Changes of Address: Send old address (exactly as it appears on mailing label for your copy of magazine) and new address, including zone number, if any, to 1025 Vermont, N. W., Washington, D. C. Allow two weeks for change-over.

Publishing Corporation of America: Aviation Publications, Inc., Wayne W. Parrish, president; Leonard Eiserer, general manager; Albert H. Stackpole, vice-president; Eric Bramley, vice-president; E. J. Stackpole, Jr., assistant treasurer.

American Aviation Incorporated: Airports and Air Carriers, Airports, Aviation Equipment, The American Pilot, Aviation Sales and Service, U. S. Aviation and American Airports. All rights to these names are reserved.

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New York Office: Administration Building, LaGuardia Airport, New York, N. Y. Illinois 7-4100, Stephen

R. Kent, director of advertising; A. B. Copeland, regional advertising manager.

West Coast Office: Park Central Building, 412 West Sixth St., Los Angeles 14, Calif. Trinity 7997. Fred S. Hunter, manager.

Chicago Office: 139 North Clark St., Chicago 2, Ill. Central 5-5915. Bruce L. McGregor, regional advertising manager.

Foreign Advertising Representative: United Kingdom—Pearl Cooper, Ltd., 213 Norfolk St., Strand, London, W. C. 2. Tel. Temple Bar 8111/2.

OTHER PUBLICATIONS . . .

American Aviation Daily, a daily news service for the entire industry. \$200 per year. Managing Editor: Keith Saunders.

American Aviation Directory: twice yearly listing of products, companies and organizations. \$7.50 each. Managing Editor: Marion E. Grambow.

Official Airline Guide: Monthly publication of airline schedules and fares. \$13.50 per year in USA; \$14.00 in Canada; \$15 elsewhere. Published from 12th to 25th of each month. Ill. Central 6-3804. Managing Editor: Robert Parrish.

American Aviation Traffic News (incorporating Air Tariff Reports): Daily rates and tariff news. \$150 per year. Managing Editor: Wallace I. Longstreth.

When & Where

Jan. 8-11—11th Annual Miami-Havana Cruise, sponsored by Florida Air Pub. Assn. and Cuban Tourist Commission.

Jan. 10-12—Institute of Surplus Dealer trade show & convention, Madison Square Garden, New York.

Jan. 12-18—Society of Automotive Engineers annual meeting, Sheraton-Cadillac and Statler Hotels, Detroit.

Jan. 18-22—American Institute of Electrical Engineers, winter meeting, Statler Hotel, New York.

Jan. 21-23—Agricultural Aircraft Assn. annual convention, Bakersfield Inn, Bakersfield, Calif.

Jan. 25-28—Plant Maintenance & Engineering Show, International Amphitheatre, Chicago. Conference at Conrad Hilton Hotel.

Jan. 25-29—Institute of the Aeronautical Sciences, 22d Annual Meeting, American Hotel, New York. Honors Night Dinner on Jan. 25.

Feb. 3-5—Society of Plastics Industry, Annual Division conference on reinforced plastics, Edgewater Beach Hotel, Chicago.

Feb. 4—Instrument Society of America, Annual Regional Conference, Statler Hotel, New York.

Feb. 4-6—Institute of Radio Engineers, Southwestern Conference, Hotel Tulsa, Tulsa, Okla.

Feb. 11-12—2d Annual Western Computer Conference & Exhibit, sponsored by American Institute of Electrical Engineers, Institute of Radio Engineers & Association for Computing Machinery Ambassador Hotel, Los Angeles.

Feb. 21-23—3d Annual Texas Agricultural Aviation Conference, Texas A&M College, College Station, Texas.

Mar. 22-25—Institute of Radio Engineers, National Convention, Waldorf Astoria Hotel & Kingsbridge Armory, New York.

Apr. 12-14—Airport Operators Council, Annual Meeting, Tampa, Fla.

Apr. 12-15—Society of Automotive Engineers, Aeronautic Meeting, Production Forum & Aircraft Engineering Display, Statler Hotel, New York.

Apr. 29-30—American Society of Tool Engineers, 10th biennial industrial exposition, Convention Center, Philadelphia.

May 5-7—3d Int'l Aviation Trade Show, sponsored by Aircraft Trade Show Inc., 71st Regimental Armory, New York.

May 7-8—National Convention & Air Meet, National Inter-Collegiate Flying Assn., University of Illinois, Champaign-Urbana, Ill.

May 10-12—Institute of Radio Engineers, National Conference on Airborne Electronics, Dayton Biltmore Hotel, Dayton, Ohio.

May 16-19—American Association of Airport Executives, National Convention, Standiford Field, Louisville, Ky.

June 7-14—Society of Plastics Industry, National Exposition, Cleveland, Ohio.

INTERNATIONAL

Apr. 5-6—Society of Plastics Industry (Canada) Inc., 12th annual conference, Mount Royal Hotel, Montreal.

May 12-14—Engineering Institute of Canada Annual Meeting, Quebec.

May 31-June 11—Canadian International Trade Fair and National Air Show, Toronto.

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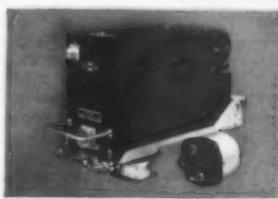
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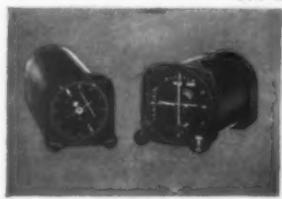
S1Z-1 Marker Beacon Receiver — Crystal controlled superheterodyne. 327A-1 Indicator shown.



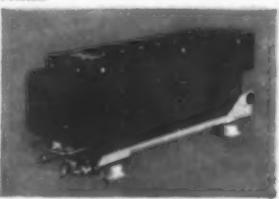
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Letters

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PROVIDING AIRLIFT

To the Editor:

I think your November 23 article "The Army and Air Transport" is extraordinarily good. I have had it photostatted.

It is almost impossible for me to stay out of this act. May I make a couple of observations?

Without arguing the relative costs and efficiencies of MATS transportation versus civil transportation, it is apparent that all lift must be used in the event of war. It is further apparent that this would be totally inadequate. The deficit can be eased by greater utilization, provided we have crew manpower to match the utilization speed-up. The deficit can only be really repaired with many more machines than crews.

To buy the necessary machines and train the additional crews and keep the whole facility on a stand-by basis is an unacceptable expense and has been rejected. Increasing passenger traffic will support some increase in lift facility, but this will be relatively slight. We now have, I believe, over 50% of our long haul passengers flying. We will never convert them all to air.

The one remaining source of support for a vastly expanded air fleet is the cargo business.

Here we have a chicken and an egg proposition. This cargo will not fly in great quantities until we have an incentive rate. The rate is impossible

without the proper airplane. The industry cannot finance the cost of this airplane. The Air Force, I believe has oriented its thinking in this direction with its C-130 project and other similar ones. For the Government simply to pick up the check for the design engineering cost for this type of plane, buy some for its own account and stop there, is but a half a step in the right direction. Using these in a "MATS fashion" puts an economic burden on the industry by taking away some of its traffic.

If these modern cargo airplanes were financed by the Government or financed by bank and insurance company capital with Government endorsement and turned over to the industry on an arm's length business basis, air freight traffic would do the rest. We would have our fleet of large multi-purpose modern aircraft at very nominal stand-by cost to the Government.

L. C. BURWELL, JR.
Vice President
The Flying Tiger Line Inc.
201 Shoreham Bldg.
Washington 5, D.C.

CONGRATULATIONS ON EXTRA SECTION

To the Editor:

Congratulations on your recent Extra Section comments (by Lois Philmus). I think it is a very well written piece which, in addition to being accurate reporting, should help some of the airports to consider the worth of re-evaluating their own programs and operations.

LEIGH FISHER
Leigh Fisher & Associates
South Bend 24, Indiana

TURBOPROP EXPERIENCE

To the Editor:

In your issue of November 9, Cy Caldwell in his "Military Comment" states "... Because of lack of money for development work, the United States lags behind Great Britain so far as flight experience with turboprops is concerned. Britain has piled up over 1000 experimental flight hours, while the United States has no more than 500-600 hours."

Although I am sure it was not intended, this paragraph might be taken to indicate that only experimental flight hours had been accumulated on turboprops in England. As Cy Caldwell is certainly aware, British European Airways have been flying their Rolls-Royce Dart-engined Vickers Viscounts on the European routes since last spring, what is not so generally known is that they have, since then, accumulated over 10,000 operational hours on these aircraft, or a total of over 40,000 engine hours.

In addition, Air France—who was just putting these aircraft into service—have done a considerable amount of training and operational flying hours on their Viscounts, amounting to at least 4000 engine hours, so that the development of this aircraft and its engines is far beyond the "experimental" stage.

CHRISTOPHER CLARKSON
U.S. Representative,
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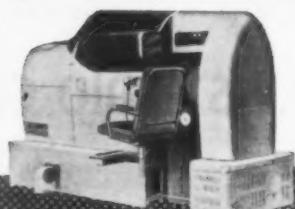
(For a detailed report on European experience with turboprops, see the November 23 AMERICAN AVIATION—Ed.)

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Editorial

A Few Bouquets--1953

LOOKING BACK over the year 1953 in aviation there is much to praise and less than usual to comment upon unfavorably. It was a good year for aircraft manufacturing and for the airlines. It was a banner year for executive aircraft and other private flying. It was even a good year for airports, despite their problems.

In contrast, the new year is fraught with a multitude of problems. The peak of rearmament has

been passed in manufacturing, although 1954 will be a good year. The airlines are faced with seasonal traffic variations for the first time since before World War II; soft spots have shown up in coach traffic and in some other areas. The airport

problem will increase in magnitude. A lot of readjusting is in the cards for every branch of the aviation business. But it will still be a good year by prior standards.

Here are a few random bouquets and observations as we look back over 1953:

by
W. W. P.

A BIG BOUQUET to Lieut. Gen. Jim Doolittle, USAF Ret., for devoting an enormous amount of time and energy to the 50th Anniversary of Powered Flight, which came to a very successful climax December 17 with observances in all parts of the country and the world. There were times when it seemed that the anniversary wouldn't be able to make a dent into the busy life of the nation. We think it did make a real impression as the actual anniversary neared.

ANOTHER BIG BOUQUET to Vern Johnson (Lockheed) and Casey Britt (Capital Airlines) who ran the record-shattering Aero Club of Washington Wright dinner December 17 in Washington, which President Eisenhower attended and at which he spoke. Flight achieved real national recognition on this occasion, the largest aviation affair of its kind ever held in the U. S.

A BOUQUET to Goodyear Tire & Rubber Co. for its magnificent hour program on the NBC TV Playhouse on December 20 in which appeared, in person, such pioneers as Ken Boedecker of Curtiss-Wright, Elmer Sperry, Jack Frye, Arthur Raymond, and others. (And we were pleased to see Goodyear letting the public know by a dignified commercial how many diversified aviation products it manufactures.)

A SPECIAL BOUQUET to United Aircraft Corporation for its contribution to the 50th anniversary, a very excellent movie called "We Saw It Happen." To Paul Fisher and all others who helped to make it an exceptional production, hearty congratulations. And let the movie be kept in circulation for more and more of the public to see.

A PAT ON THE BACK to our neighbor to the north, Canada, for adopting the all-up mail program, dispatching all first class mail by the fastest means. And in so doing, abolishing the special seven cent air mail stamp and raising the regular first class stamp from four cents to five cents, for which the public gets the fastest service regardless of means of transport. Postmaster General Summerfield, please note.

TWO PATS ON THE BACK to American Airlines, one for its promotion of its new DC-7 service, finest and most effective single airline promotion in history; and secondly, for sponsoring midnight-to-dawn music programs on major CBS stations over the country and providing real music instead of the usual juke-box junk and real announcers instead of pin-head disc jockeys. We bow in gratitude to one company which isn't afraid to feature Massenet and Stravinsky and Rachmaninoff. Smart promotion—very smart. (And thanks).

AND SOME MORE PATS ON THE BACK to President Eisenhower for putting into the Pentagon the ablest group of civilians ever put in charge of military programming for this country. We especially like the Air Force team. And a pat, too, for the new uniformed commands, who are generally much on the ball. The "new look" has a long way to go, but the improvement is marked.

HATS OFF to Louis Inwood, now Philadelphia's aviation director, for drawing 600,000 people and 119,000 cars to the new Philly terminal opening; for his flood control and bond issue work, and his civil aviation conference in Kansas City earlier in the year; and for tackling successfully (so far) the hot political airport situation in the City of Brotherly Love.

CONGRATULATIONS to the Air Transport Association for picking Under Secretary of the Army Earl D. Johnson to be its president. Good choice.

CONGRATULATIONS (and commiserations) to CAA Administrator Fred Lee for handling a difficult job as smoothly as possible under difficult conditions.

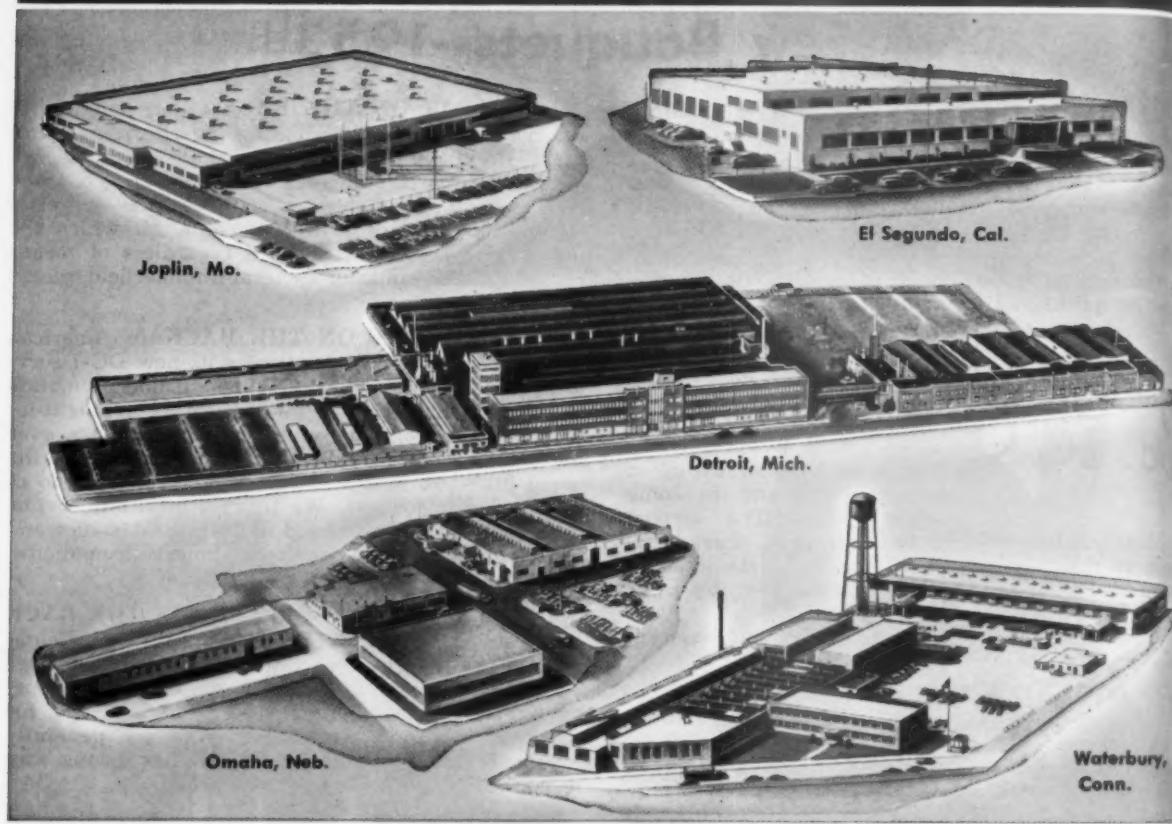
CHEERS to Bell Aircraft for the X-1A speed record, to Douglas for the F4D Skyray and the 558-II records, and to North American for the YF-100 record. (And an extra cheer to North American for that wonderful F-86 series—what an airplane!)

THANKS—MANY THANKS—to all of the wonderful people of imagination and drive who have made U. S. aviation the greatest industry in the world. And a special thanks to all of AMERICAN AVIATION's many friends here and abroad. And Happy New Year to everybody.

... WAYNE W. PARRISH

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

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Industry Spotlight

The U. S. Air Force has designated ceramic-coated 321 stainless steel as interchangeable with inconel in the hot parts of jet engines. Action resulted from tests conducted by Ryan Aeronautical Co. aimed at reducing the amount of nickel, a critical material in times of national emergency, in combustion and transition liners. Inconel contains 77% nickel, compared with 8% in 321 stainless.

The trend toward larger and larger external wing tanks has apparently leveled off. USAF experience with the 1700-gallon tanks on the Boeing B-47 was reportedly unsatisfactory. On the B-52 the USAF has decided on 1000-gallon tanks. The Boeing C-97 Stratofreighter uses a 690-gallon tank, while the dual-purpose tip assemblies on the Lockheed P2V Neptune hold 350 gallons.

Summers Gyroscope Company's new stabilizing device for business aircraft is now being tested in a Ryan Navion. Known as Summer's PAR unit (position and rate), the autopilot weighs only eight pounds and works on the simplest of principles, using direct current and no amplifying stages. The Summers design is based on a basic modification to the gyro assembly which, combined with canted mountings, produces some major innovations in control.

Although the industry's only chance for strong representation in the new Air Navigation Development Board lies in the chairmanship, the choice of chairman from among the new members is still being considered by the Commerce and Defense Departments.

Apparent lack of top level backing for the disposable load principle in cargo aircraft and helicopter design brought forth the suggestion during recent Air Cargo Day activities that the whole problem of design for airlift be given to Stanford Research Institute or Harvard for study. Transport Air Group's L. R. ("Mike") Hackney had previously hit at this problem in his paper presented before The Institute of the Aeronautical Sciences on the subject of indirect costs and their effect on cargo shipping costs.

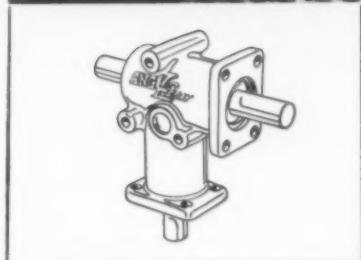
Short Bros. and Harland Ltd. is to prepare capacity for the production of the Bristol Britannia at its Belfast plant in order to supplement the Bristol Aeroplane Company's capacity of 25 a year. Short's would tool up to build a similar annual output, with 50% of the components supplied by Bristol. The program will not affect the production of Comet II's by Short's, which is now getting under way. BOAC is the only airline to order the Britannia to date but Short's indicates other orders are pending.

Gillfillan Bros. is now in production on an order for "several hundred" radar trainers for both domestic and international customers. The Gillfillan trainers, which reportedly will cost less than \$15,000 each, will make it possible for radar operators to be trained without using actual aircraft flights to provide target data for trainees. An operator sitting at a desk-like console can feed signals into the radar scope simulating various types of aircraft operating at any speed and under varying flight conditions.

First flight in the Miles Sparrowjet, a converted Sparrowhawk racer, was made on December 14 by George Miles. Converted plane is powered by a Turbomeca Palas mounted in each wing root. Conversion is reported to have cost more than \$55,000.

ANGL
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This right angle drive is part of the control system for the fuel shut-off valve. ANGLgear is often the choice when compact design and high capacity are required. These qualities make it a favorite among designers—specified equipment in many aircraft.

Model R-300 is rated at 1/3 hp at 1800 rpm—Model R-320 at 1 hp. Both models have hardened gears and ball bearings, are lubricated for life. Both are made with 1:1 ratio and with 2-way or 3-way shaft extensions.

ANGLgears are described fully in the I.A.S. Aeronautical Engineering Catalog. Refer to this publication for complete information, or write us direct.

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RESEARCH KEEPS

B.F. Goodrich

FIRST IN RUBBER



B. F. Goodrich high-speed tire lands 1327 mph Skyrocket

THE DOUGLAS SKYROCKET recently became the first piloted aircraft to go twice the speed of sound. In a NACA test, it broke its own world speed record by flying 1327 mph.

Bringing it down to earth called for tires with giant strength. Strong enough to take an impact load of 8 tons, resist the terrific heat of 200 mph landings. Yet they had to be small to retract into close space in the fuselage.

Other makes of tires had failed to meet specifications for this assignment. B. F. Goodrich engineers came up with

both nose and main wheel tires that have even given more landings than required. They cushion the landing impact with 200 lbs. air pressure, yet main wheel tires are only 24" high, 5½" wide. Nosewheel tires are 20" high, less than 4½" wide.

These tiny tires are typical of BFG's long record of engineering development on high pressure airplane tires—from the first high pressure tires for Navy carrier landings about 24 years ago to these new high-speed tires that can land planes at 250 mph. Another

recent B. F. Goodrich first: airplane Tubeless Tires—scheduled for service on Navy jet fighters.

Other BFG products for aviation include wheels and brakes, De-Icers, heated rubber, Pressure Sealing Zippers, inflatable seals, fuel cells, Rivnuts, accessories. *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

B.F. Goodrich

FIRST IN RUBBER

World's Largest Aviation Publishers

American Aviation



Eisenhower: Airpower — "Absolute need in this day and time . . . if we are to preserve this country inviolate."



Radford: "This nation will maintain a national airpower superior to that of any other nation in the world."

THE OUTLOOK FOR 1957

Strategic Air Command	55 wings
Air Defense Command	38 wings
Tactical Air Command	29 wings
Air transport services	15 wings

Ike & Radford—New Backers for Air Power

By HARRY S. BAER, JR.

WITH new top level approval and support received as 1953 came to a close, airpower moved to the forefront among the vast and varied U. S. military elements. The words of Adm. Arthur W. Radford, Joint Chiefs of Staff chairman and the country's top military man, coupled with the comments of President Eisenhower, spelled out the priority planning that is now going into the nation's air might.

The trend toward aviation as the chief military force has been approved by the JCS team, composed of the top men in the Army, Navy, and Air Force. It has received the official sanction of the President and the National Security Council.

Now it will be up to Congress in

the coming months to provide funds to carry out the desires of the chief military planners. With the Air Force the chief beneficiary of the new plan, Army and Navy officials, traditions of their respective services planted firmly in their minds, will be doing some undercover work among sympathetic Congressional members.

"Today's emphasis is actually pointed toward the creation, the maintenance, and the exploitation of modern airpower," Radford said in a key address recently before the National Press Club, one that has been acclaimed as an historic speech with profound effect on the military future of the nation.

"Today, there is no argument among military planners as to the importance of airpower. Offensively, defensively, and in support of other forces,

it is a primary requirement. Its strength continues to grow, both through increases in combat air units, and through better equipment."

President Eisenhower voiced agreement with this philosophy when he spoke informally at the Wright Memorial Day dinner a few days later. He said, "I subscribe to every word that has been said here this evening about airpower—its importance to us, its deterrent to potential enemies, its absolute need in this day and time to us if we are to preserve this country inviolate."

The President also noted that armed might alone can never provide a nation with "real safety" unless a deep appreciation of spiritual and moral values goes with it. What is needed to meet the threat, he said, is attention to

such values and the same "vision and imagination, courage and perseverance" that marked the first 50 years of the airplane's history.

A key point in Radford's address was the statement that airpower "must be complemented by other forces" during a future "indeterminate period." Does this mean air strength, particularly the Air Force, has achieved the primary role among the three services? Does it mean the Navy's seapower and the Army's land forces are now considered entirely complementary to the Air Force and the air elements of the other services?

The word "complement" means to fill out or to make complete; it often refers to something that is required to supply a deficiency, or to one of two mutually completing parts.

Radford's usage of the term indicates that large land armies and complete control of the seas are essential in today's makeup of the military. It raises the question, however, whether these elements will retain such status in tomorrow's planning. Perhaps the "indeterminate period" will soon be determined. A gradual tapering off of land and sea potential, as called for in the forthcoming fiscal 1955 budget request, shows a definite trend toward airpower as the dominate force.

Stronger Navy

Naval aviation will be strengthened, in line with JCS desire for airpower emphasis. This will be done through modernization of Navy planes and additional aircraft carrier construction. It follows from Radford's plans for superior "national airpower," which he explicitly defines as including Air Force, Navy, Marine, and Army aviation, along with the aircraft industry and civil air transportation. Therefore, JCS thinking on U. S. air strength for the future is all inclusive.

The military shape of things to come was pinpointed in Radford's talk. Most important change in planning under the direction of the new JCS team, he said, was in preparing for the long pull, not for a year-of-crisis, as past military leaders have done. The big difference is the new concept of "providing a sturdy military posture which can be maintained over an extended period of uneasy peace, rather than peaking forces at greater costs for a particular period of tension."

"Under these circumstances, the concept of the New Look is the development of an armed posture which can be supported, year in and year out, on a long-term basis; not just one year . . . nor two years . . . but for 10 years

or even 20 years if necessary. As a starter, the Joint Chiefs of Staff have picked a period through fiscal year 1957."

Commenting on the so-called traditional adherence to the concept of balanced forces, Radford said the JCS do not subscribe to relying solely on a single service or a single weapon as a short-cut to easy victory. "But a balanced force does not mean to us an artificial one-third, one-third, one-third, either in manpower or dollars," he emphasized.

Changing Balance

"The Joint Chiefs of Staff believe that our security and that of the Free World cannot at this time be entrusted to an unbalanced . . . a unilateral or bilateral . . . concept of forces. This is true in Western Europe, Korea, and Indochina today. It would be true in any other active theater of operations. It is equally true, however, that the balance in one situation may not be proper in another. The balance in one war will not be the same as that in a later war."

Upon emphasizing the importance of airpower, Radford commented, "Yet now, and for an indeterminate period in the future, under most circumstances, air forces must be complemented with other forces. Land forces, amphibious forces, anti-submarine warfare forces, and other well-rounded forces are necessary. Therefore, the aim to build up also the effectiveness of the Army, Navy, and Marines with better equipment, new weapons, and a better planning of reserve components."

The JCS chairman stated that manpower allocated to U. S. military forces in 1956 and 1957 will be lower than that planned for 1955. The brunt of the manpower cuts is scheduled to hit the Army, and to some extent the Navy. The Air Force personnel total will very likely expand somewhat. Radford's statement firmly indicates greater reliance on applications of new weapons and techniques, which would lower overall military manpower requirements.

Conventional Atoms

"Today, atomic weapons have virtually achieved conventional status within our armed forces," Radford told the Press Club. "Each military service is capable of putting this weapon into military use. Therefore, each service has a tremendous responsibility for living up to our expectations for a still greater and more powerful degree of combat readiness."

"The Joint Chiefs of Staff have no preconceived ideas as . . . what our

armed forces will look like a decade from now. The views and estimates we submitted last week are based upon what we see today as being in the best interests of the United States and the Free World. None of us can be certain of what will happen in the future. Improved guided missiles, atomic-powered ships and aircraft, an enlarged family of weapons, and new applications of electronics, all will have their effect and will be reflected in the evolution of our combat units.

"At this time of the 50th Anniversary of Powered Flight, it would seem appropriate for me to amplify what I mean by national airpower. As I use the term, it includes the Air Force, Naval aviation, Marine Corps aviation, Army aviation, and the tremendous aircraft industry and civil air transportation systems of the United States.

Superior to Any Other

"You may not fully comprehend the true magnitude of today's U. S. national airpower; but I will state unequivocally that it is superior to that of any other nation. Furthermore, the United States has so developed certain segments of its airpower as to achieve a strategic air force and a naval carrier striking force which are without peer in this world.

"The President of the United States, the Secretary of Defense, and the Joint Chiefs of Staff are of one mind on that matter: *this nation will maintain a national airpower superior to that of any other nation in the world.*

"This supremacy in national airpower, when coupled with that of our Allies, and with our collective strength in other forces, should lead the people of the United States and the free world to reflect with pride on the progress and the achievements of the last half century, and to look to the future with confidence and resolution." • • •

USAF Converts Bombers To Carry Lighter Planes

Long range Air Force bombers are being converted into carriers for lighter planes, Lt. Gen. Laurence C. Craigie, AF Deputy Chief of Staff/Development, told the American Ordnance Association in a recent address in Washington. Craigie also said that aircraft armament has not kept pace with recent developments in aircraft and electronics.

Settlement at NAA Seen Union Setback

When the CIO-Autoworkers returned to their jobs after a seven-week strike against three North American Aviation plants they not only had gained no financial benefits not offered by NAA before the walkout began but had also suffered a setback as far as union security provisions were concerned.

In October, 1950, the UAW and NAA had signed an agreement incorporating a modified union shop clause which provided that while old employees did not have to join the union, all newly hired workers had to take out a union card. This union shop agreement has been sought by the UAW and other unions since the Taft-Hartley Act abolished the closed shop, because it automatically adds to the union membership and strengthens a union's position.

The new NAA-UAW pact waters down the modified union shop to a point where it is now little more than maintenance of membership.

NAA workers who quit the UAW during the strike need not rejoin, and the same situation applies to those hired by NAA in the future. However, present union members will be required to maintain the UAW membership. Probationary employees who take out a union card have the option of dropping out of the UAW after a year.

Kaiser to Close Chase Plant in New Jersey

The Henry J. Kaiser Co., which bought full control of Chase Aircraft Co. at West Trenton, N. J., after the Air Force canceled Chase's prime contract to produce the C-123B assault transport, has decided to close up the New Jersey facility by January 31.

Some of the West Trenton personnel and tooling will be transferred to Willys Motors, Inc.'s aircraft plants at Richmond and San Leandro, Calif. Willys is wholly owned by the Kaiser interests.

Chase Aircraft, founded by Michael Stroukoff, currently holds contract termination rights to the C-123B and commercial rights to the plane. But two USAF research and development contracts held by Chase are being transferred to Stroukoff Aircraft Corp. at West Trenton—a firm which was set up when the Kaisers bought out Michael Stroukoff's 51% interest in Chase.

Fewer than 200 workers will be affected by Kaiser's decision to close up shop at West Trenton because most of the employees switched to Stroukoff Aviation when that firm was created.



Doubly supersonic. Carried aloft in the bomb bay of a B-29, the Bell X-1A late last month flew at more than twice the speed of sound: over 1600 miles per hour. The rocket-powered plane's predecessor, the Bell X-1, made the world's first supersonic flight on October 14, 1947. Maj. Charles E. Yeager, USAF test pilot, flew the research plane on both occasions.

Army Reveals Details of Nike Missile

The Army, in a recent announcement of details on its "Nike" anti-aircraft missile units, revealed that a Nike unit would soon be set up at Ft. George Meade, Md., for defense of the Washington-Baltimore area.

The Army's first supersonic AA missile designed to destroy enemy aircraft regardless of evasive action, the Nike (named after the goddess of victory of Greek mythology) consists essentially of two parts: an expendable missile and an elaborate and highly complex control system requiring some 1,500,000 individual parts.

It is liquid-fueled, approximately 20 feet long and about one foot in diameter. It has two sets of fins for guidance and steering.

Inside the Nike's body is an explosive warhead, a rocket propulsion unit, and a guidance system. When launched, the missile is given its initial

impetus by a booster rocket.

Initial firing tests started in the fall of 1946, a year after Army Ordnance asked Bell Telephone Laboratories to undertake the project.

The new addition to the U. S. arsenal of defense was developed by a service-industry team composed of engineers of the Army Ordnance Corps, Western Electric Co., Bell Telephone Laboratories, and Douglas Aircraft Co. Current mass production of the control equipment is largely accomplished by Western Electric. The missile and component parts of the Nike system are being produced by Douglas.

Essentially a defensive weapon, the Nike will provide defended areas with a far greater degree of anti-aircraft protection than was ever before possible with more limited ranges and altitudes of conventional anti-aircraft guns, Army officials say.

Earl Johnson Named New Head of ATA

Earl Dallam Johnson, 48, has been elected president of the Air Transport Association and will assume the \$42,500-a-year post on February 1. He succeeds Emory S. Land, who resigned effective December 31, 1953. Johnson's resignation as Under Secretary of the Army has been accepted by President Eisenhower, effective January 25.

President Truman first named Johnson as Assistant Secretary of

the Army in May, 1950, and he was later designated Assistant Secretary for procurement and research and development. President Eisenhower renominated him as Under Secretary on February 4, 1953.

Prior to his Government service, Johnson was an officer and director of Loomis, Sayles and Co., economic consultants and investment counselors.

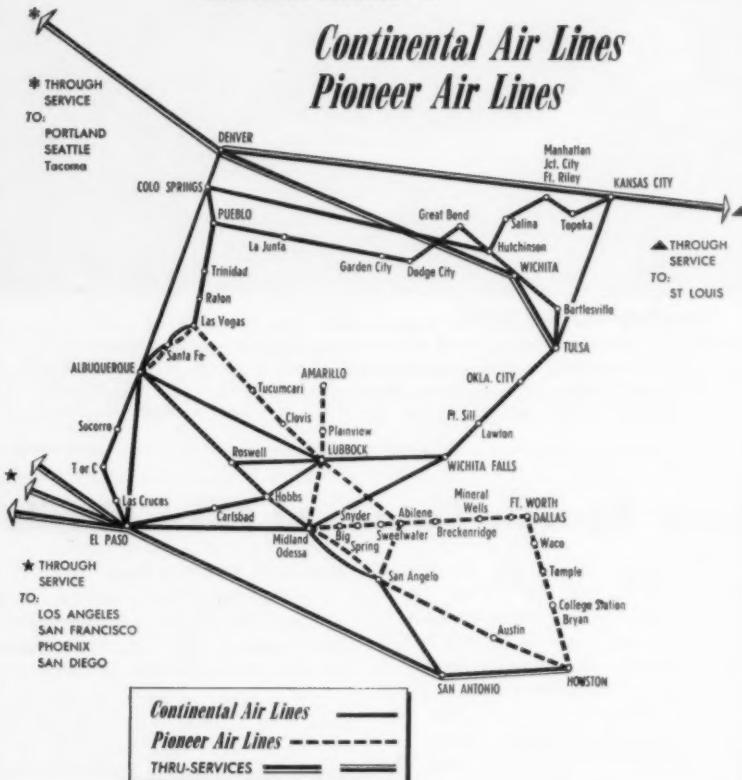
During World War II, he served in the Air Transport Command's Ferry Division and at the time of his discharge as a colonel he was deputy commanding officer of the division. Johnson graduated as an Air Corps pilot in 1932.



Johnson

Combined Routes ...

Continental Air Lines Pioneer Air Lines



CAB To Study Continental-BNF Merger

The recent voluntary agreement under which Pioneer Air Lines would be acquired by Continental Air Lines (AMERICAN AVIATION, Dec. 21) was greeted shortly after filing by a CAB-instituted investigation into a possible merger of Continental with Braniff Airways.

Actually, AMERICAN AVIATION has learned, the Continental-Braniff investigation had been decided on by CAB before the Pioneer-Continental agreement was filed. But absence from Washington of Board Chairman Oswald Ryan resulted in holding up formal announcement of the investigation until his return. In the interim, the Continental-Pioneer deal was filed.

The two issues have been consolidated by CAB for joint hearings, but no three-way merger is involved. Board said a Braniff-Continental merger would be a possibility in the event "the record in the proceeding dictates disapproval of the voluntary agreement between Continental and Pioneer."

Braniff's president T. E. Braniff expressed "complete surprise" over the Board's action which comes while Braniff is still digesting its merger with

Mid-Continent Airlines. Braniff did emphasize, however, that no negotiations have been held with Continental.

Continental's president Robert F. Six, meanwhile, indicated his line would be glad "to sit down to discuss the purchase of Braniff with officials of that company." He said "we will, of course, vigorously press for approval of our agreement with Pioneer . . . even though this would mean that acquisition of Braniff's routes would be forestalled for the time being."

CAB's investigation order speaks of "an integration of the routes of Braniff and Continental into a single unified system by means of merger, consolidation, acquisition of control, route transfer, or in any other lawful manner . . ."

Board also spoke of "the inability of Continental to attain self-sufficiency" and indicated that an "appropriate merger . . . which would join Continental with some other airline system that would integrate with Continental's own system would lower the unit costs of the carriers concerned, reduce mail pay requirements, and be in the interest of a balanced route pattern."

New Contracting Policy in Defense

A recent revision in Defense Department financing policy has placed guaranteed loans ahead of progress payments in the order of general preferences.

A directive (No. 7800.1) signed by Defense Secretary Charles E. Wilson states that the following order of preferences should generally be observed:

- Private financing (without governmental guarantee);
- Guaranteed loans (with financial institutions participating to an extent appropriate to the risk involved);
- Progress payments;
- Advance payments.

The aircraft industry is studying ways to present its particular problems to top defense officials regarding this revision. Many manufacturers have indicated the revamped financing arrangement does not take into account financial requirements of aircraft production.

Martin Asks Drive For Public Support

Aviation pioneer Glenn L. Martin, delivering the 17th Annual Wright Brothers Lecture before the Institute of the Aeronautical Sciences in Washington, predicted that aviation will make substantial progress in the second half-century of powered flight. But he qualified his statement by declaring this will be possible only if the American public takes full realization of the "achievement and the problems, the victories and the costs, the dangers and the promises of aviation."

Citing the "pervading public mistrust of its aircraft industry and unrelenting pressure on the government to keep vigil on aviation profits," he declared the industry needs adequate profits for research, machinery, and progress.

If there is a new acceptance of aviation by the public in the next 50 years, Martin foresees:

• Jetliners carrying 200 passengers crossing continents and oceans in a westward direction in zero time on the clock;

• Cost of air travel falling well below that of any other form of transportation;

• Interstellar space ships flying at 25,000 mph;

• Nuclear-powered bombers and later commercial transports;

• Helicopters carrying all airline traffic over 150-mile distances or less;

• Flying boats having speeds identical to landplanes but with greater cargo, passenger, or weapons capacity.



A Study in Waste

The Project: Jet Airplane

PROCUREMENT SPECIFICATIONS:
only 13 pages, since military procurement men knew virtually nothing about it.

EFFECT: Airplane flew in 145 days from start of shop production, took 115,000 engineering hours, cost \$850,000.

The Project: Propeller Airplane

PROCUREMENT SPECIFICATIONS:
64 pages rewritten 13 times, since military procurement men knew too much about it.

EFFECT: Airplane took 1285 days to develop, required 900,000 engineering hours, cost \$5 million, was obsolete before it flew, and was finally abandoned.

bullet-proof fuel tanks and 50 caliber machine guns. The fighters of our country had the old-fashioned tanks which made them flaming coffins if hit by enemy fire and were armed with only 30 caliber guns.

We did not appreciate that we had designed one of the world's most effective fighters (the P-51) until it had been clearly demonstrated to the whole world by the British. Then, after months of delay, it became one of our primary fighters.

Almost all of the recent developments on which our present system of defense is based were originated and developed outside of the U.S.A.

These include—among many other inventions of equal importance—the Bofors gun, the Snorkel submarine, radar, the jet engine, automatic fire control, and almost every other advancement in defense weapons with the possible exception of the atomic bomb, which we developed in collaboration with the English. Germany, in spite of having but a very small fraction of our resources, was very close to having it when she collapsed.

Times Have Changed

We have won two major wars by the overwhelming might of our capacity and genius of production. We have been fortunate enough to have the protection of wide oceans and strong allies to give us the vital time necessary to get the full might of our production under way. Our enemies did not have the means or the weapons capable of striking us a crippling blow.

We are not in this fortunate position any longer. A few long range atomic bombers, or a series of intercontinental missiles with atomic warheads, could render us almost helpless in a few minutes.

A horse and cart nation developed and produced more than two years ago, in large numbers, a jet fighter (the MiG-15) which we have been able to equal only recently. We know that the German scientists who developed the V-1 and V-2 missiles had a very-long-range missile under development when the war ended, and that many of these men have been in Russia since that time with all of their findings and data. If the history of the MiG-15 is repeated, every thinking man must recognize that Russia could be very close to what might be the ultimate weapon.

It is obviously impossible for us to compete in manpower, and up to now we have been woefully slow and disastrously extravagant in the one thing in which we should excel all competition: technical development. In it lies our best chance of averting disaster.

We must permit our *free competition*

Red Tape Can Kill Us: Mr. X

Industry leader blasts bureaucratic fumbling as suicidal drag on development and production.

By Mr. X

WE FIND OURSELVES in the terrible position of facing the possible destruction of our country. This may come through either the eventual collapse of our economy from within, due to the unbearable stress put upon it by the enormous costs of building up an adequate defense, or through military destruction from without due to an inadequate system of defense.

We find ourselves in this situation largely because we have permitted ourselves to develop in our defense procurement the same type of bureaucratic controls that the totalitarian countries use in their social and economic systems, but reject in the development of their weapons for war.

The tragic result of this has been that we, who have the greatest technical ability of any nation in the world, both as to quality of our technicians and

the vast number of highly trained technical men available, have done far less than nations of much less technical ability in the creating of new and advanced weapons over the last 25 years.

When World War II engulfed the world, the fighting airplanes of England and Germany were equipped with

Mr. X

For obvious reasons the author of this article must remain anonymous. Mr. X is well known in the aviation industry and has been active in a number of companies in various top capacities for some 25 or more years. He writes from long, first hand experience as an industry executive responsible for contracts running high in the hundreds of millions of dollars during his career.

tive enterprise system to have free play in the development of our military weapons. Industry should be asked to bid on, and develop, an article to do a specified task. It should not be bound to, and checked with detailed specifications.

We have in the armed forces nearly 200,000 bureaucrats who do little but write specifications and check, criticise, and eventually approve every minute point in a military procurement program. The designing engineer spends more time and energy in making sure that each facet of his design meets these detailed specifications and putting these through all the required tests, than he does in producing the end object.

An illustration of how costly this bureaucratic control is, is the history of the development of one of our first jet fighters. The military procurement people had had no experience in jet-powered aircraft at this time so they were unable to compile the detailed specifications which customarily go with an order for the development and/or procurement of an aircraft. Therefore the specifications were brief—13 pages.

The new airplane flew in 145 days from the date of the start of shop production. Engineering development required only 115,000 man-hours and the first airplane was delivered at a cost of \$850,000. This airplane was the prototype for 2500 fighters.

In contrast to this, four years earlier the military let a contract to the same manufacturer to develop another airplane of conventional type. The procurement people knew all about this type of airplane so there were 64 pages of specifications rewritten 13 times.

This fighter required 900,000 engineering hours, took 1285 days to develop, cost \$5,000,000, was obsolete before it flew, and was finally abandoned.

We have a strange paradox in the fact that we use the controls of a totalitarian nation in our military procurement, while both Germany and Russia, in their development of new weapons, gave their scientists the utmost freedom to accomplish an assigned task. Because of this freedom to do an assigned task with a minimum of interference, Germany was able to create the V-1 and V-2 missiles in a very short time; the schedules on our own missile development are shockingly slow.

If we are going to regain the technical advantage that we *can and must have* in order to survive, we must see to it that our military procurement is not burdened with such a mass of bureaucratic controls that initiative is stifled and competition is eliminated. It is only through a *free competitive effort* that we can obtain the technical leadership we *must have* at a cost that *will not destroy us economically*.

• • •

News Briefs

The North American F-100 has reportedly reached a speed of Mach 1.38 or about 910 mph at 35,000 feet. The USAF has not confirmed the figure.

Boeing Airplane's employment has hit a new peak in the Seattle division. November saw almost 37,400 people employed, the highest total since World War II. Turnover is at a new low of 1.8%.

Earnings for Northrop Aircraft during the three months ended October 31 totalled \$512,315, or 80c per share. This was a drop from the figure for the same period in 1952, which resulted in reported earnings of \$576,078, or 91c per share.

Maximum tetraethyl lead content of the avgas sold to customers of Esso Standard Oil in Grades 91 and 100 will be three cubic centimeters per gallon as long as present conditions continue.

New chairman of Flight Safety Foundation is J. Carlton Ward, Jr., president of Vitro Mfg. Co. Named to the executive committee was Luis de Florez, retired rear admiral. Florez replaces E. R. Quesada.

A new \$15,000,000 terminal building at Philadelphia International Airport has been dedicated and placed in service. Primarily of three-floor construction, with a small fourth floor and control tower, the building uses finger type layout.

First Lockheed RC-121 radar Constellation was due for delivery to the AF late last month. Plane was scheduled for McClellan Air Force Base.

A total of \$36,000 will be granted in fellowships for advanced studies this year at the Daniel and Florence Guggenheim Jet Propulsion Centers at Princeton and California Institute of Technology.

Jets will beat turboprops to the commercial transport market in the U. S. in the opinion of W. A. Patterson, president of United Air Lines. Patterson put the turboprop at least a year or two behind the straight jet.

Preliminary plans for the National Air Museum have been bolstered by a joint contribution of \$25,000 from the

Air Transport Association and the Aircraft Industries Association. The money will be used to study cost, extent, for and site of the proposed building.

A Super Constellation of Eastern Air Lines has flown from New York to Miami in 2 hours 29.5 minutes, with average speed of 450 mph.

Assistance given by the Air Defense Command's radar network saved an estimated 404 lives and \$20.9 million in aircraft from July, 1952, to June, 1953, according to an ADC survey. The report recommended that pilots become more familiar with the service.

A new contract for F-89D weather fighters has been given to Northrop Aircraft. The firm's backlog now at approximately \$500 million. Production at Northrop is now devoted entirely to "D" model Scorpions.

Direct service from London to Chicago and Detroit is planned by Pan American World Airways starting April 30. Flight will operate on Fridays with a DC-6B, via Gander and Shannon. All flights will be tourist.

Four new members of the Air Transport Association have been elected: C. E. Woolman, Delta-C&S; L. O. Barnes, Allegheny; T. C. Drinkwater, WAL; and H. H. Harris, NWA.

A recommendation that airline crew members wear shoulder harnesses in addition to safety belts during takeoffs and landings has been made as a result of a study of the crash of a National Airlines DC-6 at Elizabeth N. J. in February, 1952. Suggestion was one of several in a report on the accident issued by Cornell Crash Injury Research.

Spartan Aircraft is moving its maintenance operation for the Army Aviation School at Fort Sill, Okla., to Frederick Municipal Airport, 38 miles away. Expansion at Fort Sill made necessary the move of all work on Army fixed-wing and helicopter aircraft.

Cost of the Bell X-1A, including preceding research, has been put at \$10 million by Lawrence Bell, president of Bell Aircraft. Purpose of the high speed research craft is to obtain information of use in guided missile development.

An Inside Look at the Fiscal 1955 Budget

Long range planning and emphasis on air and atomic power seen keys to next budget.

A SIGNIFICANT swing to airpower as the predominant military force will be reflected in the request for fiscal year 1955 funds, soon to be revealed in President Eisenhower's budget message to Congress. The period running from July 1, 1954, to June 30, 1955, will mark an important turning point in favor of the Air Force.

Military money requested for Congressional approval will not show a radical departure in strength of forces among the services, but it will show a decisive edge to the AF.

It will also be indicative of the following trends in current military thinking:

- **Incorporation** of a long range plan for continued peak strength.

- **Greater reliance** on modern technological advances in weapons, with a gradual departure from conventional warfare methods.

- **Increased emphasis** on airpower and atomic weapons, not so great for fiscal year 1955, but more so in fiscal years 1956 and 1957, with 137 wings planned for mid-1957.

- **Necessity** of cutting down overall military costs in line with the new administration's economy efforts.

Immediate Problems

The fiscal 1955 budget request will not reflect the complete long range thinking and desires of the new Joint Chiefs of Staff. When the new members took over last summer, they were confronted with a budget cycle already under way. Immediate problems for fiscal 1955 planning had to be rushed, and they did not have time to conduct the deliberate and painstaking studies that were desired.

Their most significant achievement in the six-months work span was a decision to achieve continued preparedness without aiming for a specific date on which the enemy might strike. This was a major departure from the previous JCS routine of building up for a particular period of tension, a very costly procedure that is now difficult to blend in with the current administration's economy drive to balance the budget.

Particular credit for JCS thinking on air emphasis is due Gen. Nathan F. Twining, AF Chief of Staff. His efforts to bring airpower to the forefront paid off with JCS approval of the planned AF buildup to 137 wings by June, 1957.

Present JCS planning shows some



Wilson



Twining

reluctance to depart from conventional military traditions. It is evident, however, that the thought of doing so, with dominant emphasis on airpower, is firmly planted in the minds of top defense officials. But they need more time to work it out.

"The Joint Chiefs of Staff are opposed to radical changes in a hurry because they are militarily undesirable," Adm. Arthur W. Radford, JCS chairman, said recently. "From the standpoint of the security of the nation, they are not practicable."

Radford is counting on what he terms "a process of evolution" to bring about the desired changes. This process might move considerably faster than the expression indicates in view of Radford's statement that "signs of the times do point unmistakably to changes in the future."

The JCS team has fashioned military plans, to date, through fiscal 1957. This is only a starter. The year itself is not considered a key buildup period when the nation, due to international tensions, must be at peak strength. It was just a time, picked at random in the early rush, which the JCS will extend accordingly.

By the middle of 1957, the "new look" concept will be firmly planted. Fiscal 1955 has been called the "interim look." Thus, the 24 months between July, 1955, and July, 1957, shape up as the key period for a complete turnaround from the present year's balanced forces concept. Within this period, airpower will attain an undisputed dominant role among the three military services.

Almost complete dependence on what have been essentially considered futuristic weapons, such as atomic and thermonuclear devices coupled with air for delivery, will likely prevail. U. S. technological advances, which up to now have been looked upon as more or less experimental, will become operational.

The budget request coming up will not spell this out explicitly. Figures to be presented before Congress will fall considerably short of making up some \$5 billion that was cut from AF funds last spring.

The overall military budget request for new money will be under the \$36 billion asked for this year by the Eisenhower administration. Congress granted \$34.5 billion in appropriations for fiscal 1954. Although defense officials have been extra cautious in discussing approaching budget reductions, Wilson indicated the new appropriation figure going to Congress would reflect a reduction less than 10% of the Eisenhower figure submitted to Congress last spring.

The defense spending request for fiscal 1955 shapes up in the form of a \$3 billion to \$3.5 billion reduction. It will reportedly show a drop of 7% to 8% of the \$42 billion Pentagon officials estimate will be spent this fiscal year. This would give the Department of Defense between \$38.5 billion and \$39 billion to spend in fiscal 1955.

Up to Congress

Division of this money among the three services becomes the big question mark at the moment, although it has been calculated. President Eisenhower and the National Security Council have approved the monetary plan. It's now going to be up to Congress to complete the job and set next year's course for the military.

Authoritative Pentagon sources say the division of expenditures among the services puts the AF in a highly favorable position, money-wise. This already has been clearly indicated by discontented rumblings from the Army and the Navy. Long range planning dictates that the Army is slated to shrink to 18 divisions, perhaps less, with a personnel figure running lower than a million men. The Navy is due to drop some 30 or more ships. The Navy and Marine Corps will have some 850,000 men.

For the AF, it is a different story. Instead of cutbacks in men and equipment, the AF will expand. It will eventually have 30,000 aircraft and some 980,000 personnel.

Highlighting the AF's transition to the nation's leading force is the planned buildup to 137 wings by June, 1957. This date is as far ahead as the JCS team has looked at this time. When the Radford staff plans further, it is most probable that U. S. air strength will zoom upward, Pentagon authorities feel.

* * *

Interview

with

A. C. Omberg

Director of Engineering & Research
Bendix Radio
Division of Bendix Aviation
Corporation

What's Ahead in Airborne Electronics?

A. C. Omberg, 44, director of engineering and research for Bendix Radio Communications, joined Bendix in 1944 as chief engineer of the research and development design department.

A native of Memphis, Tenn., he attended Southwestern University for two years and received his BS, MA, and electrical engineering degrees from Vanderbilt University. Serving first as a radio operator aboard ships, he later became a transmitter engineer for a Nashville radio station. He also served as consultant physicist for Vanderbilt Hospital at one time. Prior to joining Bendix, he served as an assistant director for the operational research group of the U.S. Army Signal Corps.

Omberg is both a pilot and navigator, as well as holder of a first class commercial radio telegraph and telephone operator license.

Q. How did Bendix Radio Division get its start in aviation?

A. The corporate predecessor was the Bendix Radio Corporation, which was formed through a consolidation of several manufacturing and engineering firms in 1937. The emphasis at first was on airborne communications equipment; with expansion came navigation equipment and other units for the aviation industry. One of our most famous early receivers, the Bendix RA-1, was originally manufactured in 1937 and is still being used in many parts of the world.

Today we are running a 100 million dollar-a-year operation with approximately 6000 people. We have almost a million square feet here in Baltimore devoted to work on a very substantial backlog. Our engineering department has 1300 people, including over 300 field engineers.

Q. Are you primarily engaged in the airborne side of aviation electronics?

A. No, I can't say that this division is primarily airborne by volume, but by tradition there is a lot of emphasis on it, because it was the field we started out in. Actually we are one of the large producers of heavy radar. The radars we are building range from the big FPS-3 to GCA's for the Navy and CAA and an Air Force surveillance radar, the CPN-18.

Another big field that we dominate is direction finding, starting with the ADF and going on to the VOR. We've built the majority of military VOR's. We also build the ground direction finders like the URD-2 and URD-4. They work in control towers and point to the direction from which the communication waves are coming. We build a VHF direction finder of this sort for the CAA towers. It's called the CA-3300. That set draws a line on the radar scope whenever a plane calls in, and lets the tower operator identify the plane he's talking to.

Of course we've still got a big line of airborne communications, ranging from low frequency to UHF, and we are developing new very small and light weight versions for the whole communication and navigation job. In our advanced research and development department we are working on advanced radar techniques and, of course, on guided missile systems.

Q. To what extent are you in the GCA market?

A. We have been in the GCA from the beginning. We built the MPN-1 for the Navy, and most of these sets are still operating. We are building the MPN-5, the ASR-3, and PAR-2 today.

Q. What percentage of the civil market do you have?

A. We have orders covering 35 airports for CAA. We've gotten a lot of compliments on our ASR-3 at Baltimore and on the PAR-2 that's operating at Philadelphia.

Q. What improvements are likely to take place in radar in the next five to ten years?

A. One of the more obvious ones is in the system's nature, where we look to the rationalizing and finalizing of the system's requirements. Then down through the equipment requirements to make secondary radar play a bigger part in a lot of the operations, as distinct from primary radar.

Primary radar is generally defined as the kind in which the return energy is a portion of the incident energy on the target—the energy you send out. In secondary radar the return is reinforced by a transponder in the target.

Transistors . . . not ready for airline use

Q. Have you any interest in building either the transponders or beacons?

A. From the commercial side we have a very great interest in building the so-called radar safety beacon and working along with ANDB and the CAA and RTCA, as far as and as fast as the evolution of the thing permits.

Q. What do you feel about the size, weight and cost of safety beacons?

A. There is a great deal of argument as to the number of codes that are needed. The points of view range from the very simple scheme of having two, three, or four codes and assigning them on the spot at each airport, to the other extreme of assigning a unique code to each airplane.

However, if the thing is going to be operationally practical and successful, and by that I mean largely universal, then the weight and cost have to fall within very definite bounds. I would hazard a guess that a weight of 5 pounds is about right. I would like to see the specifications produce a unit that could be built for around \$1,000, but it will probably end up at between \$2,000 and \$4,000.

Q. Doesn't that restrict the number of aircraft that can have such units?

A. Well, that kind of problem exists already in instrumentation. It exists, for example, in the type of equipment and accuracy that are required as VOR becomes more dominant as the prime method of navigation.

It is a basic fact that a small airplane can't carry, let alone afford, a lot of equipment. At the same time our traffic control procedures are tending to require a rather large minimum of airborne equipment.

I think it is doubtful if every light airplane will carry a radar safety feature, although one segment of industry is already a little bit apprehensive on that subject and would like to have a flying corner reflector. This corner reflector is in essence a series of plates at right angles in the aircraft structure, which provides a deliberate reinforcement of the primary radar return signal.

Q. Do you look on it as practical?

A. Not for the immediate future; perhaps for a little later, but certainly you couldn't design one for production today. This is part of a subject bigger than just beacons. We are into the broader question of how much, if any, instrument flying shall be done by private pilots and what basic equipment is required for those operations.

Again, when we speak of something being $\frac{1}{2}$ ATR and costing \$2,000 or \$4,000, we know there will be equipment available for private pilots that does essentially the same job considerably cheaper, but not to maximum airline standards.

Q. Since the transponder apparently would be a requirement for all aircraft, wouldn't that be pretty good assurance of a market?

A. I guess so, but I just can't believe it is going to be a requirement for all aircraft. We would like to see the operational specifications arranged so that it would embrace all aircraft. But so far the basis of operation, the minimum requirements for the safety beacon, is such as to tend to cross it out of the private flying market.

Q. What improvements in radar manufacturing techniques are coming, such as use of transistors and other new devices?

A. As far as basic developments that might revolutionize radar in the next three to five years are concerned, I don't believe there are any on the horizon.

Of course, there is no telling what's just over the horizon. Transistors are good examples. They appeared on the horizon several years ago, and they were truly revolutionary. Today they are still not ready for extensive airline use and it will probably be several years before they can prove themselves able to meet the over all requirements. We have shown examples of transistorized units to the airlines and they are quite promising, but there is no evidence of any overnight changes.

Q. Does microstrip show any real promise of cutting down weight?

A. We have followed it from the beginning and on the surface it has some good features, especially for microwaves where certain complex "plumbing" is required. In other cases where the "plumbing" is of a little different type, the savings are negligible.

Magnetic Materials Problem

Q. Are magnetic amplifiers in your program at all?

A. Yes indeed, we are very interested and I think every year from now on you will see more and more of them. There's a warning that should be sounded here: it's not easy to get magnetic materials that are the same from one batch to the next. We have the job of not only making magnetic amplifiers that can equal the performance of vacuum tubes, but of learning to make them predictably and economically.

Magnetic amplifiers are certainly an important and sound approach for future designs and there will be a continual increase in their use. However, it is my opinion that they will not affect the use of vacuum tubes more than 10 or 15 per cent in the next five years.

Q. In what specific areas do you think they will be applied first?

A. First in the control of motors, in changing from electrical to mechanical power, such as in automatic pilots, engine controls, and instrumentation.

Q. What is the relative cost of a magnetic amplifier compared to a tube circuit?

A. In one attempt that we made to replace a vacuum tube servo amplifier, a very simple type that's used on an airline aircraft, we came up with a two-to-one increase in cost in using a magnetic amplifier. However, that should be subject to continuous change and review.

Q. You did get an improvement in reliability, though?

A. That's the main advantage: the reliability in life and the ability to cope with a little worse environment are big factors. They have advantages in temperature and vibration.

Q. Weight-wise is there any advantage?

A. No, there is no obvious advantage weight-wise, although that answer depends on the availability and uniformity in some of the more unique magnetic materials.

Q. What is your feeling on using a GCA unit between runways and rotating it for multiple runway operations?

Airborne radar . . . the airlines need it

A. We have done a lot of theoretical work in that field and feel it is one that can be used a lot more than it is. We have no actual equipment being built to do it.

Our studies show that with accuracies that are easily obtained today we can place a single radar in the center of an airport and, with a relatively simple computer, transfer the indicator from one runway to the other. We've determined the proper location for the radar on several typical airports. We believe that it is quite practical.

Q. Would you comment on Bendix airborne radar?

A. Bendix Radio has allocated substantial funds for the development of an airborne weather radar for use by commercial airlines. We will have our commercial prototype flying in a couple of months and plan to have production units available for delivery next fall.

Q. What are the views of Bendix on the wide divergence of opinion on 3 cm versus 5.7 cm radar?

A. There are two aspects of the problem. Most of the published discussions have dealt with the relative performance of the two systems. Not much has been aired on the question of availability of the components for either system—that is, as to just when either system could be made available.

Radar Availability

For example, there are magnetrons available for X-band, but at the present time, to my knowledge, there are no suitable magnetrons available for the 5.7 cm installation. This availability is critical, because all important components must not only be available but proven before they are used in commercial systems. We have found that it would cost between \$100,000 and \$200,000 to develop a magnetron and the best promised date we could get was one year.

Q. What about performance?

A. The controversy on the radar frequency stems from arguments regarding the relative attenuation of X- and C-band energy in high rainfall rates, and the consequent ability of the two radars to show what lies beyond a storm—that is, through a storm.

These arguments, we believe, have gone into a lot more detail than some of the data really justifies. The whole thing is very dependent upon how frequently you encounter precipitation of a certain magnitude in the air, and how large a distance it is spread over.

Accurate data of that sort is essential if you are really going to take a stand on the ability of one radar or the other to see through storms. We don't believe anybody has any accurate data on the actual areas covered by extremely heavy precipitation.

We have our opinions and data on the whole subject, and we do not believe that X-band radar is inferior to C-band radar in terms of the operational conditions that are going to be encountered.

When it comes to the problem of getting advance notice of turbulent conditions, if you plot the relative performance of the two radars, the answer always comes out in favor of the X-band system. The distance at which storms can first be seen may be as great as 50% to 400% in favor of the X-band system; in no case is it in favor of the C-band.

For actual advanced warning of where turbulence there is no doubt but that X-band will be definitely superior.

Q. Then why do people suggest the other band?

A. There is no argument but that the X-band will have better ability to detect storms through moderate rainfall and in clear weather, but as the rainfall that the plane is actually in gets very intense, the controversy concerns itself with how much further the C-band will penetrate than the X-band.

We feel that the real controversy is over how much rainfall actually exists and over how many miles and how often, and that none of the experts have any real data.

Q. We presume from your stand that Bendix is building an X-band radar?

A. Yes. We believe that X-band today and for the next five years offers a definitely superior airborne radar in weather detection. This is the result of a lot of theoretical study, as well as a practical appraisal of the existing state of the art.

Q. Haven't the operators said specifically that they want the other band?

A. No. There are tentative Arinc specifications for C-band; but we think that the people who have made these theoretical studies, and our interpretation of the studies that have been made, are on very firm ground. If we didn't, we wouldn't be investing large sums of money in it.

We've talked to several of the airlines and we believe that what we are building is going to satisfy their requirements. We also think the time difference of probably two years is important. Airlines need such radar as soon as they can get it.

Q. If the components for X-band radar are already available, why does it cost so much to develop?

A. Well, let me get one point straight, we are not developing this radar, we are designing it. It's built in ATM sizes to go in the plane's radio rack, like any other radio. It's designed to commercial specifications for commercial operation and maintenance, and in this respect it's very new. This production design takes time and money.

Q. What about weight and cost?

A. Our target is a weight as close to 100 pounds as we can make it. It will probably be a little over that. The cost should be less than \$15,000.

Q. Do you feel there will be a difference in cost between the two systems?

A. I would guess there would be a cost differential in favor of the X-band system, because proven X-band components are available in production quantities.

Q. Would the refusal of the market to go to X-band have any bearing on your future program?

A. Yes. It certainly would. Our business is founded on building the equipment that the aviation industry needs and we believe that the 3 cm radar is the best answer to this particular problem, at this time.

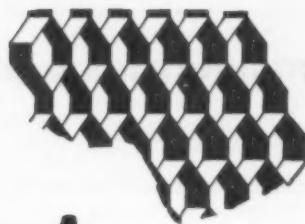
In general, the airlines certainly will not deliberately fly through a thunder storm. Storm avoidance at an early enough time to permit a small angular deviation from their track to go around it, and not a violent gyration to

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Communications equipment ahead of planning

pick a way through it, appears a reasonable answer, and also one that will reveal the X-band radar as better.

Q. How would adoption of any new DME system affect VOR and the rest of the system?

A. Past experience has shown that no new system today will affect the actual flying of airplanes in less than three to five years, regardless of how "thoroughly developed" it is. If it is just being released for production, then it has to go through production, installation, and evaluation of the ground equipment.

Q. Is the number of companies active in DME apt to increase?

A. When the DME comes daily into operational use, the number will be just about the same as in VOR.

Q. When can we expect airline fleets to be equipped with DME on a scale which will permit it to contribute to better air traffic control?

A. About two years after a firm decision on a system is reached.

Q. How is the VOR-DME program progressing compared to the "common system" schedule estimate?

A. The VOR portion of it is progressing very well. All the ground stations are installed that were originally visualized and a lot of developments have occurred. The installation of dual airborne installations is increasing in number and airlines with at least a single installation of VOR must be around the 90% mark.

The DME portion had been lagging because of non-availability of airborne equipment sufficiently light and simple to be attractive to the airline operators without big problems on maintenance and upkeep. When that hurdle was overcome by one or two developments, this second problem of a conflicting system developed. To date it remains unresolved.

Q. What are the trends in communication equipment?

A. The major one has been development of units with 50 kc spacing with lots of channels. We have felt for some time that the equipment side is ahead of the operational planning side. For over a year we have had a transmitter provided with 50 kc channels and a receiver capable of receiving 50 kc channels. However, the full use of the number of channels hinges on things other than equipment availability.

One of these is obviously the basic planning, which has been saddled with the problem of fully assigning the role of the Air Traffic Control Signaling System—deciding on how it's going to be used, where it's going to be used, what it is. This planning to allow the instrumentation of the signaling system has rather slowed up the logical development of the straight communications.

I feel that the normal progression, the replacement of up-to-date equipment capable of receiving and operating on more channels, would have proceeded a lot faster were it not for the attendant necessity of planning this equipment to work with the signaling system, which itself isn't fully defined as yet.

Q. Has there been much improvement in the size and weight of airborne electronic equipment in recent years?

A. Yes. The VOR receiver is roughly half the size of the ADF and is of two to three times the complexity, in order to get the vastly increased complexity into half the size and half the weight some real improvements were necessary.

There haven't been many examples of a directly modernized equipment in the airplane. Equipment has either stayed "as is," for standardization, or has been replaced by a new system.

One good example will be available when we produce our new ADF receiver, which will give a direct "before and-after" comparison on the size and weight. I think that will show you the improvement that has been made. The fact that it will have our new flush loop is another major advance.

Q. What about communications receivers and transmitters?

A. You can take any one of our present pieces of equipment and compare it with the corresponding device 10 years ago. As one example, during the war we were making the 522, a five-channel transceiver. We are building a military transceiver today which has 1700 channels instead of 5, 50 vacuum tubes instead of 15, weighs less, and is smaller.

Reliability vs. Complexity

Q. When you make a unit three times more complex, what about reliability in operation?

A. There has been a lot of talk about complexity affecting reliability. I think the real question should be about the requirements. One very important thing to consider is the trend producing the requirements. You have the choice between equipment reliability and over-all existence. If you really need 1700 channels instead of five channels, you are going to get a difference in the reliability of the equipment.

For example, it might very well turn out that to make approaches in 100-200 feet ceilings you need an automatic approach coupler for any high probability of success. Then you have your choice between not making the approach or doing it with complicated equipment.

Furthermore, the reliability has not come down as much as the requirements have come up. Comparing a five channel versus 1700 channel transceiver, it's not 5 to 1700 in reliability. It is probably nearer three to one. But, in return, you have gotten a great deal that you couldn't do without.

Q. Are new developments being put to work toward simplification while at the same time maintaining reliability, such as Project Tinkertoy production and miniaturization?

A. Production such as that of Project Tinkertoy is not intended for the market where you have only one or two thousand pieces; its economies only come into the picture where you need large quantities and quickly. Perhaps some components which are common to many pieces of equipment will be made available in Tinkertoy form.

As for miniaturization, there has been quite a lot of effort expended in this field, first in miniaturization, and then in sub-miniaturization. The problems delaying progress here are those of standardization and timing. The civil operators, who are only beginning to know what miniature tube performance is going to be, are loathe to accept the unknowns of the sub-miniature tubes.

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Lockheed in California increases engineering staff

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- 2. nuclear energy**—Lockheed has announced a contract to study nuclear energy applications to aircraft.
- 3. advanced fighter**—Lockheed has received a development contract for the highly-advanced XF-104 day superiority fighter.
- 4. new super constellation orders**—New orders for the Super Constellation have increased Lockheed's backlog tremendously. Lockheed now lists 18 airlines throughout the world as Super Constellation customers.
- 5. jet transport**—Lockheed is continuing design work on jet transports. Other classified development projects are in progress.

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JATO bottles can be fitted to F-84F, but are not standard equipment.

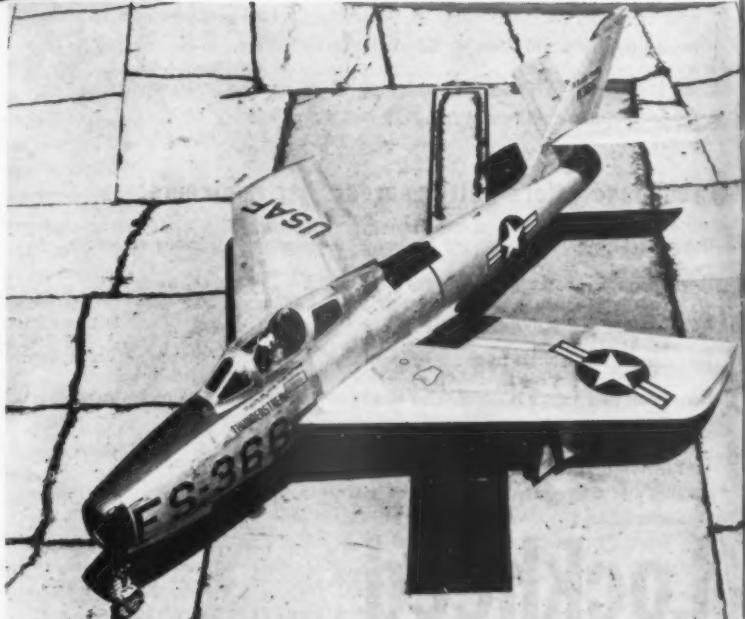


Republic's Thunderstreak



FIRST Air Force swept-wing fighter-bomber, the "F" carries more armament as a ground-support plane than does the F-84G. The Thunderstreak is in full production for the USAF and for North Atlantic Treaty countries.

SWEPT WINGS and greater range distinguish the "F" from F-84G. Both can refuel in flight.



PRIMARY MISSION is fighter-bombing, but Thunderstreak also qualifies as interceptor and escort fighter. Six 50-caliber machine guns are standard equipment; rockets, bombs, and napalm can also be carried in varying amounts.

U.S. NOW OWNS PROVEN SURVEILLANCE RADAR

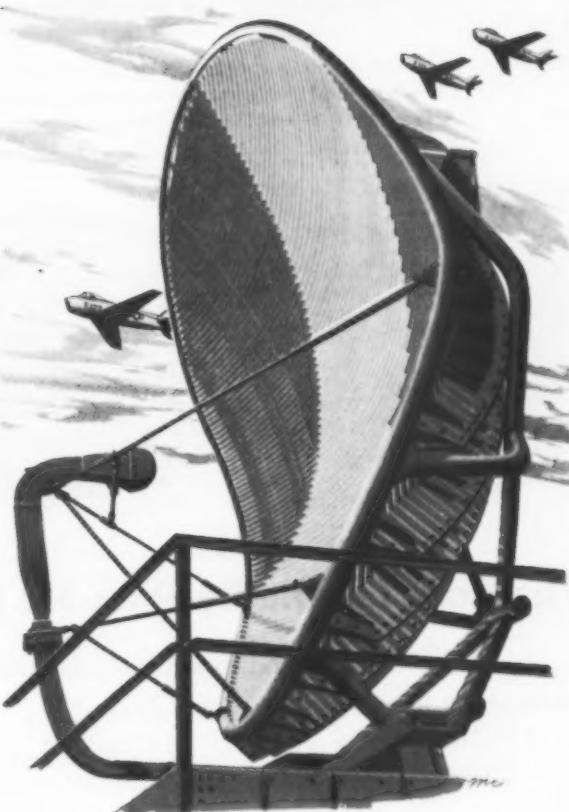
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PROVEN PERFORMANCE

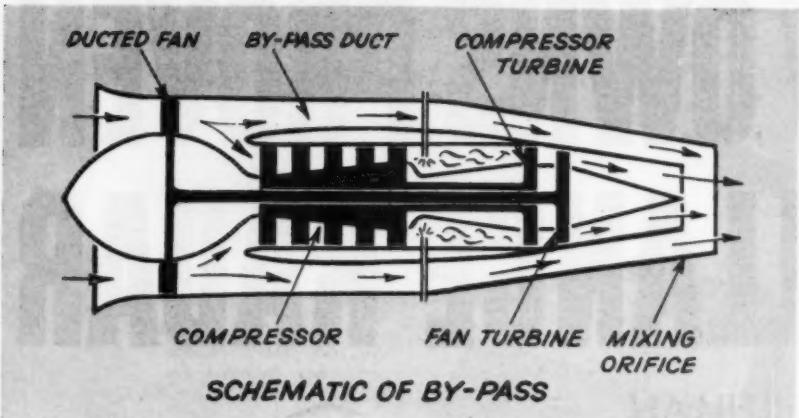
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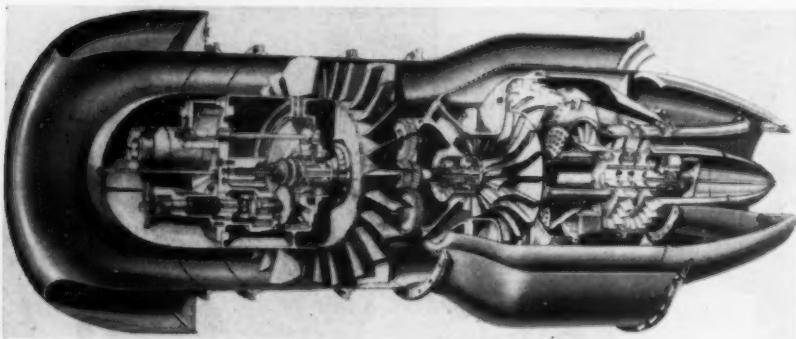
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ELEMENTS of by-pass system. Engineering details can vary widely—fan may be geared or ungeared, compressor can be centrifugal or axial, number of turbine stages can vary. Below, cutaway of the Aspin II; accessories are in the nose.



The Case for the By-Pass Jet Engine

High thrust and good afterburning possibilities claimed for by-pass in 550-650 mph range.

By JAMES HAY STEVENS

RECENT pronouncements by U. S. airline engineers focus attention on the by-pass engine as the jet unit that combines cruise economy with high take-off thrust and simplicity. Yet this transport panacea is still an unknown quantity to most of the world's aeronautical engineers.

Only one engine has flown, the Turbomeca Aspin; possibly only one other has been successful on the bench, the Rolls-Royce Conway. Even more paradoxically, the principle of the by-pass was patented by Frank Whittle in 1936.

Earliest ideas concentrated upon the ducted fan, in the form of a shrouded propeller driven by the gas-producing turbine/compressor unit, or boiler.

Back in 1946 Britain's Power Jets

Company had run a "thrust-augmenter" on the bench. This unit was bolted on the back of a normal turbojet and consisted of a turbine wheel and a multi-blade fan mounted concentrically. The unit extracted high-velocity energy from the jet exhaust and converted it into low-velocity, large mass-flow energy, thereby improving propulsive efficiency.*

Differential expansion problems caused by mounting the cool fan blades outside the hot turbine buckets caused the abandonment of this system.

The by-pass engine is a specialized application of the ducted fan, which avoids these thermal problems by having the ducted propeller in front.

The most common layout, and that used both for the Aspin and the Con-

* $\eta_{th} = \frac{2}{1+r}$, where r is ratio of jet velocity to airplane speed.

way, is to accelerate the air entering the intake and to divide the slipstream between the compressor/combustion turbine cycle and the by-pass. Generally, about 60% of the intake air is by-passed, leaving 40% to generate the internal cycle.

Basic design principle of the by-pass engine is to keep operating temperature high for maximum internal efficiency and the jet velocity low for good propulsive efficiency. This combination inevitably leads to fuel economy over the straight jet.

Because jet velocity is relatively low, take-off and climb thrusts are high. Although primarily a long range engine, the by-pass presents unique possibilities for augmentation. This is because the exhaust contains more unburnt air than does that of a pure jet. Moreover the air is cooler and, therefore, more power for less fuel can be obtained by afterburning, since thermal efficiency of afterburning varies inversely as the temperature.

The possibilities of more efficient power boosting for take-offs and climbs must have obvious attractions to airplane designers—particularly those with transport projects.

Strong Opinions

Opinions for and against the by-pass run strong. Designers of turboprop and turbojet companies state categorically that complication is excessive and not worthwhile for a seven per cent gain in fuel economy.

These arguments are difficult to refute, since Rolls-Royce refuses to give any figures. On the other hand, Joseph Szydlowski, head of Turbomeca, makes some very interesting claims for his little Aspin engines. For the Aspin II he gives a cruising specific of 0.52, which is much lower than the theoretical best for the pure jet of 0.7.

In an analysis Szydlowski claimed that for a four-seater airplane with a cruising speed of only 280 mph and a range of 700 miles the by-pass could beat the piston on consumption. He assumed that an engine of 900 hp would be required, weighing 1430 pounds and giving an airplane of 5720 pounds gross.

The equivalent by-pass weighs 350 pounds and leads to an airplane, with the same payload, of only 2770 pounds. Reduced drag leads to an overall saving of 30% in fuel, according to Szydlowski.

British authorities have so far made no claims of such exceptional economy for the by-pass, but it is being generally said in informed circles that fuel consumption will be 25% to 30% below that of the pure jet for the same speed. Engine expert Rodwell Banks, former Director General of the Ministry of Supply, has several times stated his faith

in the by-pass bracket.

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in the by-pass for the 550-650 mph speed bracket.

George Edwards of Vickers-Armstrongs has designed his Type 1000 military long range transport around four Conways. He stated recently that he was completely convinced that the by-pass was the only engine for the Atlantic route and that he had absolute faith in the ability of Rolls-Royce, and Chief Designer A. A. Lombard, to make it work.

Edwards is designing a civil version, the V.C.7, in parallel with the military airplane which will give a six hour Atlantic crossing—the maximum time, Edwards says, that anyone wants to sit in an airliner.

The anti-by-pass school says:

- The by-pass is more complicated, bulkier, heavier than a pure jet.
- The large duct makes installation difficult—particularly with British buried-engine practice.
- Accessibility is poor.
- Mixing problems of the hot and cold exhaust streams at different speeds will give rise to losses.
- Interaction of two streams will be noisy because of shearing action.
- Operating brackets of altitude and speed for full efficiency will be restricted.
- Actual in-flight fuel economy is less than 10%.

These opinions, it must be emphasized, although given by engineers of leading engine makers, are the result of preliminary design study. Either as a result of their first investigations, or because they had to concentrate upon other requirements, their companies dropped the by-pass and so their knowl-

edge is limited.

For instance, de Havilland had to concentrate on the Gyron fighter engine, although the company had had promising results from a single-can by-pass test unit. De Havilland also found that ducting and jet-mixing problems looked formidable—two features that have given Rolls-Royce some bad headaches.

Proponents of the by-pass make the following claims:

- Complication is rather less than that of a two-spool engine, much less than a turboprop.
- Bulk and weight are not much more than in a pure jet. Installation presents no difficulty, whether buried or in pods.
- Accessibility presents no problem, since the duct outer casing can be made easily removable.
- Mixing problems have been overcome—but the answers are not revealed.
- Because of reduced jet velocity, noise is much lower than with a pure jet.
- Operating brackets are no more restrictive than for other refined, low-consumption jets—rather less so, in fact. It is also possible to adapt a basic engine to give maximum efficiency for

different speed/altitude combinations by varying the by-pass ratio.

• Fuel economy in flight is actually better than on the bench.

George Edwards is emphatic about the second item, saying that there are no installation difficulties—not even the ducting of so much air through or around the spars. Of course, by using his crescent, or compound-sweep, layout he ensures ample thickness at the root where the engines are housed.

It is the same authority who amplifies the seventh argument: fuel economy in flight comes not only from a better specific fuel rate than in the pure jet, but it also picks up on the turboprop because (a) the airframe is cleaner, (b) there is no slip stream drag, and (c) cruising altitude is higher. One must also always remember that, since specific fuel consumption is measured in pounds per hour, the faster airplane always overcomes its higher specific to some extent.

Recent developments suggest further intrinsic advantages for the by-pass. High-power turbojets in high-speed airplanes have raised acute cooling problems—an ironic touch since this was the engine that was to eliminate all cooling troubles. Ram effect pre-heats

Turbomeca Aspin By-Pass Engines

	Aspin I	Aspin II
Take-off thrust, pounds	485	795
Specific consumption	.64	.55
Max. continuous thrust, pounds	352	660
Specific consumption	.58	.52
Dry weight, with electric starter, pounds	320	320

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the air entering the fuselage and it has been proving increasingly difficult to cool the structure around the tail pipe without incurring severe drag penalties.

The by-pass provides a beautiful cooling sheath—and one that is doing useful work at the same time—thereby eliminating the need for stainless steel or titanium frames and skin around the jet pipe.

It is likely that the generally cooler tail end may have a military significance. During World War II, the Germans used infra-red detectors in night fighters and this system has been developed for some homing missiles. It seems reasonable to suppose that the cooled tail of a by-pass would emit much less infra-red radiation.

The speed range quoted for the by-pass, 550-650 mph would allow cruising at Mach .85, the figure generally accepted as being "safe" from the transonic fighter. Furthermore, there is always that reservoir of cooled air available for relatively economical afterburning spurs.

In Britain the tendency is to design engines for a purpose. Fighter engines are highly stressed, and flexibility of operation and control are prominent features. Contrariwise, the engines for transports or bombers are lower stressed—being therefore lighter—and the emphasis is, of course, upon fuel economy.

From this it can be deduced that the Conway is in the latter group and it might well require some beefing-up if it were to withstand boosted speed bursts.

To sum up: the opponents of the by-pass are many—in fact their ranks include every company that is not making one. The designers of leading turboprop and turbojet companies are outspoken in their disparagement of the system. One French company, Société Rateau, designed a by-pass engine, the SRA1, in secret under the German occupation, but abandoned it after some bench runs. Turboméca has built and successfully flown the Aspin engine, but it is of small size. Only Rolls-Royce, supported by Rodwell Banks and the technical experts of the MoS, are making the large by-pass.

The first criticisms were directed against the by-pass as being a theoretical engine, criticisms that were unanswerable until engines could be run and proved in flight.

Turboméca has provided a portion of the answer with the little Aspin, and soon Rolls-Royce will be adding its part with the Conway RCo1 and RCo3. If the enthusiasts are right the by-pass will have outstripped the world—if they are wrong the failure will have been very expensive.

• • •



Extra Section

By William D. Perreault

RYAN Aeronautical Corp. in San Diego is making interesting use of physically handicapped workers. Ryan, a major supplier of engine exhaust systems and sub-contractor on jet engine components, uses a good many drop hammers to shape sheet metal parts. When these come out of the hammers there are still good many small wrinkles in the parts which require straightening. Ryan has about 15 deaf mutes in a room where all this hammering goes on. They do a good job, enjoy the work, and have no communications problem—they use sign language. Ryan also uses a blind man on electronic assembly work in its growing electronics section.

TWA's strict time requirements for engine change of the Douglas DC-1 brought Cannon Electric Company into the aircraft business, according to Robert J. Cannon, son of the company's founder and present president of the company. The quick-disconnect-pin connector which the senior Cannon designed for motion picture applications proved a decisive factor in speeding up engine change. The DC-1 used a five-pin connector on each firewall. The Convair B-36 uses some 3800 such plugs, exclusive of electronic equipment. Largest single plug made by Cannon was a 180-pin unit for the Lockheed Constitution. In line with the general trend toward miniaturization, Cannon has now developed specialized plugs for computers, missiles, instruments, etc., virtually doubling the number of pins in a shell of a given size.

A visit with Vernon Sanders, executive vice president of Thompson Aircraft Tire Co. in San Francisco, raised Cain with some of our favorite ideas about out-of-balance in recapped tires. Tire balancing today is such a simple, straightforward job, you can be sure it's right when it leaves the plant. Guess it's those first few rough landings that tell the story. Thompson, which does recapping for more than 100 airlines around the world, is probably the most experienced company in the aircraft tire recapping business. Today many airlines let Thompson decide whether a tire is suitable for recapping. Generally the process doesn't go beyond the sixth recap and only a small percentage of tires reach this point.

One of the clearest impressions to be gained from a tour of some of the industry's component and accessory plants is the dynamic nature of the group. For instance, everyone appreciates the outstanding job Pacific Airmotive Corp. has done in engine overhaul work for both the military services and the airlines. (They recently handled modification work on Pratt & Whitney T34 turboprop engines, probably the first agency to do such work in this country). But PAC president Tom Wolfe has led the company in a successful invasion of the accessory and equipment field. PAC has a wide line of accessories ranging from control valves to complete pressurization systems. Manufacturing activities, which in 1952 represented only about 11% of overall PAC work, has now grown to about 40% and is still growing fast.

At Rohr Aircraft Corp. in San Diego, the country's only plant engaging in design and manufacture of complete power packages for prime aircraft manufacturers, color codes are used to mark all the major pieces of equipment associated with a given contract. Thus motor mounts, jig fixtures, templates, etc. for a given contract may all be green with yellow trim. At a single glance, shop foremen can see what project is under way in any area. It simplifies the whole equipment handling problem. Rohr is now building nine types of power-eggs and seven types of exhaust systems.



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AIRBORNE EXPLORER—Rugged dependability of Sikorsky helicopters in wilderness operations is again being demonstrated in northern Canada, this time by Hudson Bay

Mining and Smelting Co., Ltd. Here the company's big S-55 is unloaded on a narrow ledge at 6000 feet, where crews are making an extensive geophysical survey.

AROUND THE WORLD WITH SIKORSKY HELICOPTERS



ARCTIC ANGEL—Greenland Eskimos, displaced 80 miles further north by the air base at Thule, are aided by Danish technicians flown in by Sikorsky helicopter. Such mercy missions are routine for Thule-based Air Force H-19s, which have flown as far as 200 miles into the icy Arctic wastes of Greenland on daring rescue flights.



INTERNATIONAL SERVICE—Airline passengers whose transatlantic flights begin or end at Brussels can now have the additional advantage of SABENA Belgian Airlines' international passenger helicopter service, in big S-55s, from Brussels to Antwerp and Rotterdam; to Liege, Maastricht, Cologne and Bonn; and to Lille.



NEWEST SERVICE—A big Sikorsky S-55 is the newest aircraft to join the National Airlines fleet. The 10-passenger helicopter currently is based in the Miami, Florida area, headquarters of the airline's North-South trunklines. National's Sikorsky is the first large helicopter thus far put into operation by a major scheduled American passenger airline.

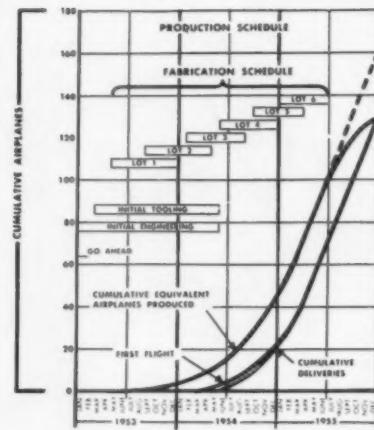
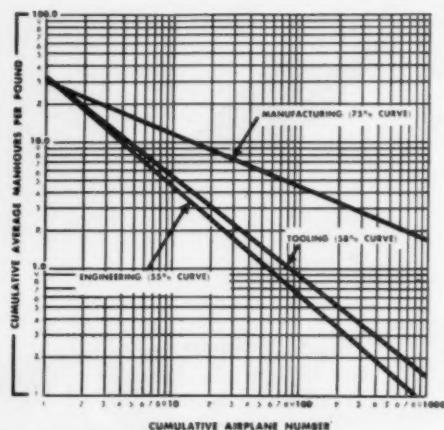


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Estimated Workload & Production Schedule (Typical Airplane Program)



BASIC ASSUMPTIONS are embodied in the charts above. From them come predictions at far right on facing page.

How Convair Forecasts Its Labor Needs

Role of the estimator involves bringing together past experience and future project requirements.

By WALTER A. KILRAIN

HOW one of the industry's leading manufacturers goes about estimating the manpower that will be needed for the production of a new airplane has been revealed by its supervisor of statistics and cost analysis. Convair's Chester May offers a description of a working method that the planner can use in edging out onto the shaky limb of prognostication. In doing so he paints a picture of the estimator as half prophet and half historian.



May

"The estimator's job," says May, "is . . . a matter of evaluating a current airplane model in the light of experience on an earlier one. . . . Somewhere there must be a tie-in with history."

More and more often the estimator is being asked by management to make such tie-ins, as manufacturers and the Government apply more pressure in their attempts to take the wasteful peaks and valleys out of the aircraft industry. Whether his assignment involves estimating a plant's mobilization

potential or analyzing his firm's ability to handle a proposed project, the estimator may expect to be called on often, and often in a hurry.

When the assignment comes, he will find himself juggling a baker's dozen of variables. Both the man-hours needed in order to produce the first plane and the rate at which the workload will continue will be affected, May notes, by such factors as the following:

- Complexity of design;
- Refinement of design;
- Weight of the airframe;
- Rate of production;
- Degree of subcontracting;
- Ability of management;
- Availability of manpower;
- Layout of the factory;
- Degree of planning;
- Lot sizes and contract quantity;
- Extent of design changes.

Basic landmarks in this welter of variables are the two charts shown above: a direct labor estimate—including separate estimates for engineering, tooling, and manufacturing—and a production schedule.

The first is a composite of the individual estimates, which are shown on the page at the right. The second is determined to a large extent by the terms of the contract (number of

planes, delivery dates, etc.)

Steps in the estimating process as described by May are as follows:

• A graph showing the man-hours that can be expected for each pound of weight, decreasing as the number of planes increases, is plotted on the basis of past experience. This is the direct labor estimate. The same graph will reveal cumulative total hours.

• Since the delivery dates are known for the various airplanes in the contract, the number of planes can, in effect, be replaced by a calendar. Thus the cumulative labor forecast curve is plotted.

• Monthly man-hour requirements can then be found by simply subtracting for successive months.

• By assuming some particular working schedule (May uses 150 to 200 hours per month per employee) the manpower requirements for each month can be calculated.

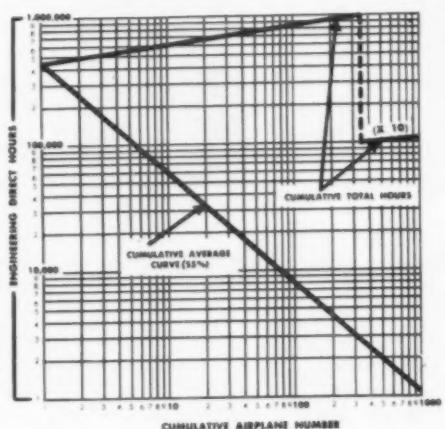
How this works out in the engineering department can be illustrated by a quick check of the accompanying charts.

According to the production schedule, 100 airplanes (or their equivalents in parts) will have been turned out by the end of June, 1955. The direct labor estimate for engineering indicates that this will require a total of approximately 800,000 hours. The curve for the engineering direct labor forecast can now be plotted: above June, 1955, a

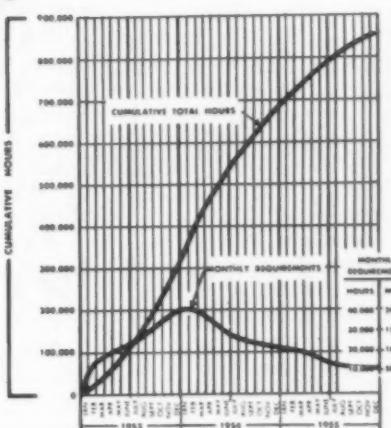
How Estimates Are Broken Down

DIRECT LABOR ESTIMATES

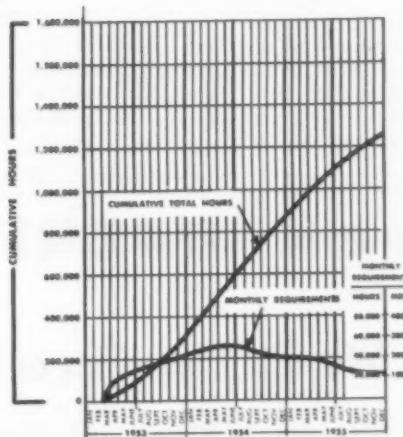
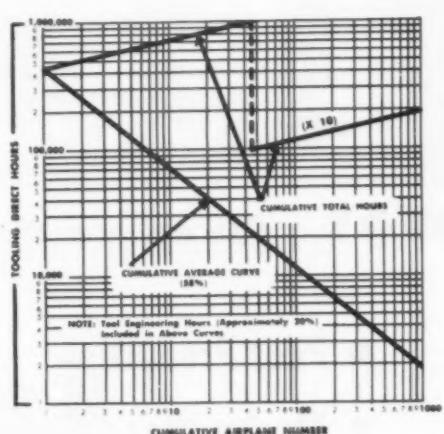
ENGINEERING



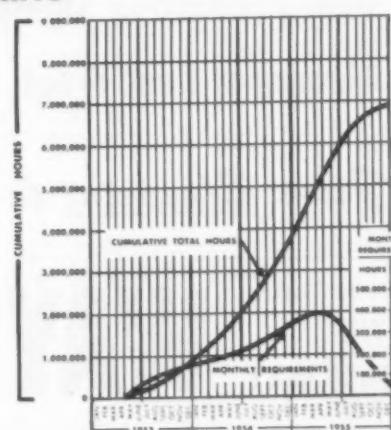
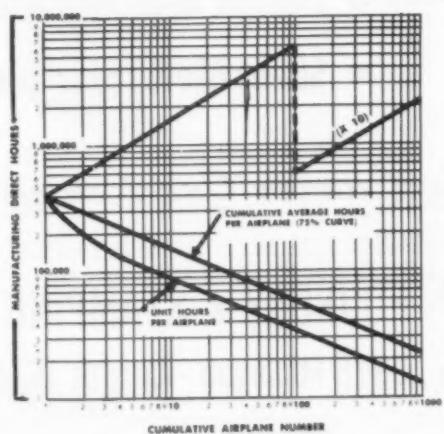
DIRECT LABOR FORECASTS



TOOLING



MANUFACTURING



point is placed at the 800,000-hour mark. In the same way the rest of the labor forecast can be completed.

After the cumulative total hour curve is plotted, the hours and consequently the man-power needed during each month can easily be arrived at. In this case, the results for June, 1955, prove to be approximately 14,000 hours and 70 men.

The prophet-historian has thus completed his trip from the past, with its records of how many man-hours it took to build a pound of airplane, into a variety of possible futures. If the trip is to be attempted at all certain assumptions must be made.

Despite a variety of conflicting opinions on the proper sort of curves to use in the direct labor estimate, "straight line plotting on log log paper is generally accepted for planning purposes," according to May. Basic or initial hours, from which point the estimates of hours required per plane start to diminish, are assumed to include time spent in engineering and tooling through the month in which the first plane makes its first flight.

A maintenance factor must also be considered. This may be defined as the time that must be spent in engineering or tooling in order to keep drawings and tools up to date, correct de-

sign deficiencies, make normal repairs, and effect similar routine adjustments. This factor in tooling may range from 1½% to 3% of the basic hours for each month of the program.

Among May's assumptions are several "ground rules," basic data which must be supplied:

- **A schedule**—Go-ahead date; starting and completion date for initial engineering and tooling; starting date for manufacturing; initial flight dates; completion date for fabrication and beginning of phase-out; schedule of equivalent airplanes produced; schedule of deliveries.

- **A direct labor estimate**—Estimated initial hours; cumulative average curve; unit curve for manufacturing; cumulative total curve.

- **A proposed work week**—Basic work week; extent of overtime; vacation and absentee factor (usually amounting to from 5% to 10%).

With these ground rules established, a realistic production schedule in hand, and reliable historical data in the files, the estimator is ready to set to work. Given this much, he will be glad to learn, "estimating and forecasting for planning purposes is not a difficult task." • • •

Keif to Head Petroleum Group

Newly named chairman of the Committee of the American Petroleum Industry Committee is Albrecht Keif of New York. Keif is manager of the Aviation Sales Division of the Texaco Company.



Keif

The Aviation Advisory Committee conducts studies of the taxation of aviation petroleum products and legislation affecting the sale and distribution.

Keif, who succeeds Middlecamp DeCamp of Louisville (Standard Oil Co.) in the post, previously held the position in 1947-48. He also served from 1948 through 1950 as chairman of the Aviation Technical Service Committee of the Division of Marketing of the American Petroleum Institute. He has held his present position with the Texaco Company since 1938, having previously been assistant manager and before that the firm's aviation representative in Chicago.

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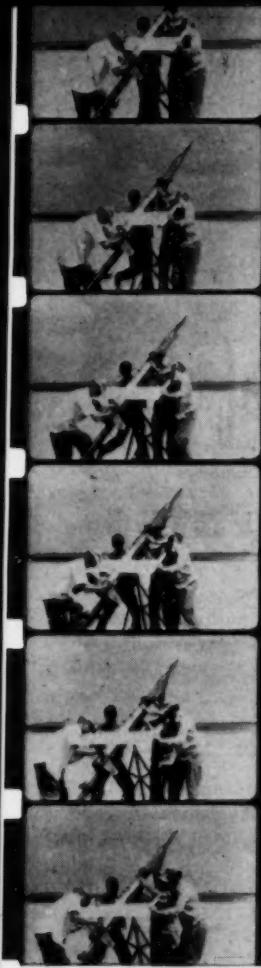
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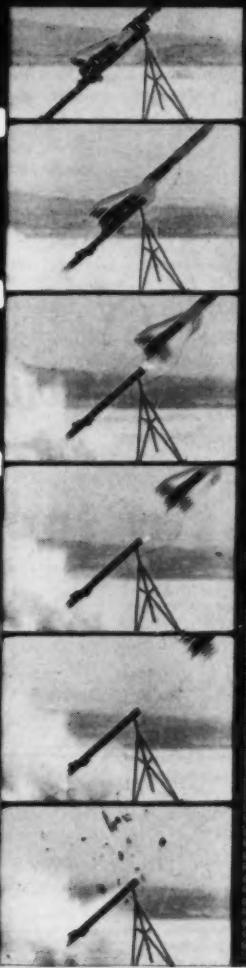
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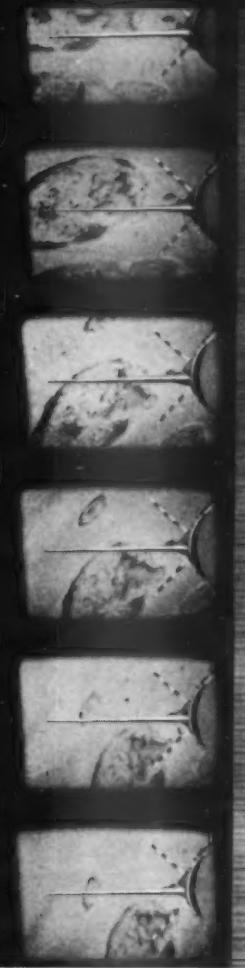
AEROTHERM



Engineers mount cameras and X-wing on supersonic rocket to test new design.



On California desert, rocket begins flight reaching 3 times the speed of sound.



Desert craters fade away as camera records speed effect on new experimental wing.



Here, another wing design flaps violently from the pressure of the supersonic speed.

Lockheed Scientists Shape the Forms of Future

Lockheed's Expanding Science Center Improves Today's Planes and Develops New Designs for the Future

FIRST IN THE NATION'S ALL-WEATHER DEFENSE. Lockheed F-94 Starfires are jet interceptors loaded with electronics for almost automatic flight. Starfires protect vital U. S. cities, even in darkness or bad weather. For 8 years, Lockheed has built more jets than any other manufacturer.



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Parachuted to earth, rocket camera is recovered with film data vital for the future.

of Future Flight

ns for the Era of Automatic Flight

The above film strips take you behind the scenes to show Lockheed scientists testing new wing designs for future aircraft many times faster than today's. This is an example of advanced research at Lockheed's expanding Science Center. Scientist-engineers work with nuclear energy, pilotless aircraft, electronics systems, new metals for the era of automatic flight.

Lockheed discoveries in pure science are matched by Lockheed progress in applied science. Lockheed's science of design has produced a radar-laden team of protecting military aircraft—flying radar stations, almost automatic interceptors, anti-submarine patrol bombers. Skill in science of production enables Lockheed to produce 12 different models simultaneously—and all models are on schedule!

SCIENCE CENTER — Future forms of flight are studied here in Lockheed's new Engineering and Science Building.



FIRST FLYING RADAR STATION. Lockheed Super Constellations, with radar humps, provide Navy and U.S.A.F. with new concept of defense—a new method of detecting an enemy hours in advance through applied electronics.



FIRST ELECTRONIC SUB PATROL—Advanced models of Lockheed P2V Neptune Bombers give U.S. Navy long-range sub patrol with destructive power and advanced sonic devices.

TOMORROW'S MATERIALS. Planes 10 to 25 years from now, currently under study by Lockheed, will require new materials to withstand tri-sonic speeds. Here, Lockheed scientist checks X-ray film of new metal.



COMING SOON—Look for other dramatic new Lockheed models soon, including XF-104 Day Superiority Fighter.

Lockheed

Lockheed Aircraft Corporation, Burbank, California, and Marietta, Georgia

LOOK TO LOCKHEED FOR LEADERSHIP

Announcement

Important news in the U.S. aircraft industry this month was establishment by Lockheed of a new Missile Systems Division, a separate organization integrating 10 years of research and development in the field of electronics and pilotless aircraft. Important progress in current top-secret work at Lockheed prompted decision to establish new division in expanding field of automatic flight.



ONE OF 20 Noratlas medium cargo transports recently purchased by Brazilian International Airlines from SNCA du Nord.



NORD 2501, often described as a French "Packet," is built in several plants of SNCAN. Above, fuselages at Bourges.



BRISTOL HERCULES 738 engines (2070 hp) are economical and light, for dirt runways. Above, assembly at Les Mureaux.



WING SECTION assembly at Les Mureaux plant. Simple design speeds all phases of production. Most components are French. Below, front view of first production aircraft on field.



ENGINE ASSEMBLIES and central wing panels move down production line. First production aircraft (below) was delivered in mid-1953. Output is scheduled for six per month by end of '54.



The Defense of Western Europe

IRRESPECTIVE of the fact that air power is the dominant force in modern war, armies and navies are in being and will be used to the full extent of their capabilities. As President Eisenhower remarked recently, the United States would have to use every weapon it possessed, to its best advantage.

In Western Europe, the small NATO armies face the huge Red Army, with its numerous armored divisions. Both sides are well supplied with effective tactical air power. But these forces of land and air are not equal. In fact, they are so unequal that nobody, in the military or in civil life, ever has suggested that this relatively small NATO force would attack the Soviet Union. Always it is spoken of as a defensive force.

Without referring to the atomic weapons, the German General Adolf Heusinger, Retired, analyzes the army position in Western Europe. His analysis was published in the German Federal Government Bulletin of October 1, 1953.

If the Russians invade Western Europe, he says, we must not only consider the region between the Alps and the North Sea. That area is just a portion of European defense, although the decisive area. The entire front, he says, extends from Turkey, through the Balkans, across the Alps to the Baltic Sea and to northern Scandinavia.

West Germany, however, is the decisive part between the Persian Gulf and Scandinavia. If West Germany were lost, the entire front would be torn into two parts. The loss of West Germany would force the abandonment of the Netherlands and Denmark. It would be doubtful if France and Belgium could be held.

The consequences would be incalculable. England then would come within the range of the Soviet "V" weapons and tactical air force. Russian submarines would have the possibility of cutting the Atlantic lines of communication from the western coast of France and the North Sea. The economic power potential of West Germany and its western neighbors would fall into the hands of the Soviets.

General Heusinger points out that we have learned in the past war that it is impossible to hold a rigid defense line of great extent. Hitler time and again commanded that a certain line be held, counter to the suggestions of his military advisers. Time after time the Russians succeeded, through the concentrations of their forces, in breaking through that thin front line and causing a collapse.

The distance between the Alps and the North Sea—the critical area—is about 350 miles. It is clear that the West will not be able to gather sufficient forces to create or hold a rigid defense line of such length, especially since there is no natural line of defense.

There is, General Heusinger declares, only one means to use against a Russian attack—flexible defense, highly mobile defense, which should not cling to every inch of soil, according to the Hitlerite dictate.

The West should confront the East with this

combat method. The defender must attack the attacker wherever a chance for doing so presents itself. In other words, this is the offensive-defensive—the concentration of attacking forces at various points, as quickly as possible, to disrupt the Soviet operation plan.

The only possible way to deal with numerically superior troop masses, including armored divisions, is to be superior in mobility. If we can move our troops at a speed of 180 miles an hour, while the enemy can achieve only a tenth of that speed—18 miles an hour—then the prospect of beating him at the crucial point of the decisive battle increases correspondingly.

An army, including its armored divisions and its motor transport, moves very slowly along congested roads. There is no such thing as batting along at 40 or 50 miles an hour. An average of 20 miles an hour would be good, with a division of infantry strung out over 50 miles of roads—most of them quite narrow in Western Europe.

Furthermore, because of enemy tactical air forces, movement with any degree of safety will be possible only at night or by day in very bad weather.

One Big Traffic Jam

An army traveling along the ground moves slowly, in a continuing traffic jam that resembles those that occur on roads leading from New York City to the beaches on the Fourth of July.

Thus it should be evident, without unduly belaboring the point, that flexible mobile defense can be achieved in one way and one way only—by the use of transport aircraft to airlift anything that can be airlifted, including artillery and light tanks.

Since, as General Heusinger states so convincingly, the defense area of free Western Europe is not limited to a line which runs from the Baltic Sea to the Alps, but covers the area extending from Turkey through the Balkans up to north Scandinavia, the transport airplane assumes an even greater importance as a means of moving troops and their thousands of tons of equipment and supplies in a mobile defense operation.

With sufficient transport aircraft, an army division—or divisions—could be moved in 24 hours from one end of Europe to the other and deposited in the combat area where a concentrated attack was imminent. If the division is forced to move overland, the journey would take, not days, but weeks.

We have considered the movement of troops without any mention of air cover. But little movement will be possible unless our tactical air forces—those of the United States, Britain and Western Europe—achieve air superiority. It need not be, and initially cannot be, air supremacy. But our foot soldiers and our tanks and artillery at all times must be protected by our own fighter planes, which should be superior to those of the enemy, whose tactical air force may be double ours in number.

In discussing the necessity for air transport of

We are not prepared to stage a mobile defense

troops, it should be mentioned that no such airlift capacity at present is in existence. It could be managed now if we could call in our military transports from all around the globe and mobilize the civilian air fleet under the Civil Air Reserve Fleet Plan. But to do that would seriously, perhaps disastrously, curtail our transport operations in other theaters.

If a global war starts, it will not necessarily be confined to Western Europe. In fact, it almost certainly will not be. There will be other active theaters of war, if only to disperse our combat forces and use up our air transport fleet. It easily may be as necessary to strengthen our forces in the Orient as it is to strengthen Europe.

The inescapable conclusion is that we are not at all well prepared to stage a flexible mobile defense of Western Europe. We simply haven't enough transport aircraft and trained air crews to do the job on a scale sufficiently large to be very significant.

We should not consider only a continental conception of defense in the prevailing world political and strategic situation. We must glance from Europe to the Far East and be prepared for war anywhere, and have the means available to fly to that war—not go by slow troopship, in the teeth of the submarine menace. However, in this air-atomic age, the U.S. Army must place its major dependence on the troopship to move its personnel overseas, because we have failed to provide enough aircraft for their transportation.

Considered as a separate operation, without any other contributing factors, the defense of Western Europe presents a doubtful, not to say discouraging picture.

If that is so, and if, as the Russians assert, they are determined upon a course of world conflict, why don't they start now?

There can be only one chief answer: the defense of Western Europe does not lie solely or perhaps even largely in Europe. It lies—to mention only one place—in Omaha, Nebraska, headquarters of the Strategic Air Command. This, of course, oversimplifies the problem.

There undoubtedly are other reasons for Russian hesitation. The U.S. Navy, with its carrier-based, medium-range bombers carrying atomic weapons, certainly is one. The lack of Russian war experience with submarines may be another—crews may need more training, or a bigger fleet may be planned. The state of the Russian economy may be still another. However, the greatest single deterrent to war at this time seems to be SAC.

There is prevalent in the public mind a great misconception about the way SAC would operate in a global war. Attention is concentrated upon the cities and their atomic destruction. That may come, of course, for industries usually are situated in cities or on their outskirts.

SAC's greatest initial contribution to the defense of free Europe is the fact that to deal with it over Russia, the Soviets must keep thousands of fighter aircraft permanently based in Russia.

If these planes were not tied down there to cope with American and British bombers of long range and medium range, they could be added to the Soviet's

tactical air forces, in which case they would outnumber our tactical forces perhaps as much as four to one. But the Russians cannot leave their homeland undefended, if only for psychological reasons.

To a lesser extent, the U.S. Navy also ties down hundreds, if not thousands of interceptors.

The initial business of SAC is not to destroy cities, but to destroy the Red Air Force in the air and on the ground. Concurrently with that mission, or following closely behind, is the destruction of facilities such as air bases, with all their supplies, including oil supplies.

Air forces, armies, and navies all operate on oil. When the oil supply diminishes seriously, the war draws near its end, as was demonstrated conclusively in Europe and the Orient during World War II. Near war's end in Germany there were hundreds of fighter planes on the ground and no gasoline or oil available so they could be flown. This was due, in large part, to the destruction of communication facilities, principally railroads.

No Railroads, No Oil

Russia is noticeably weak in railroads. In fact, they are inadequate to the Communists' peacetime needs. Systematic bombing of that system would in time knock it out, or reduce its effectiveness so that it could not support the needs of the air force or the army. Russia is a vast country, and oil is not everywhere. It must be transported hundreds, and to some areas thousands, of miles from the oil fields and the refineries—which in themselves are primary targets.

To summarize three factors, SAC, oil and transportation: If SAC is successful in gaining air superiority over the Red Air Force, it can proceed to the systematic destruction of the Soviet oil industry and transportation system. If this process can be continued long enough and successfully enough, the Red Army and the Red Navy eventually must run out of gasoline and oil.

Now, let's tie this in with our Western Europe mobile defense plan and see where we stand: In the first place, in the event of war the primary mission of the Military Air Transport Service (MATS) will be to support SAC movements anywhere around the globe carrying personnel, equipment, and supplies to advance bases. This very likely will call for the use of every four-engine transport in the MATS fleet, and many of those in the CRAF. This will leave no transports other than the present Troop Carrier wings assigned to the theater commander to move Army divisions.

In the second place, it is planned to increase the utilization of aircraft by flying them 12 hours a day instead of the present seven hours. That is possible so far as the aircraft are concerned. However, we have no trained crews available for this increase in flying hours.

What does this all boil down to? It boils down to the fact that we cannot have a truly mobile defense in Western Europe unless we increase our transport fleet until it has four times the airlift potential that it has today. In short, we are preparing to fight tomorrow's war with the logistical conceptions prevailing at the end of World War II. The Soviets cannot fail to become aware of this.

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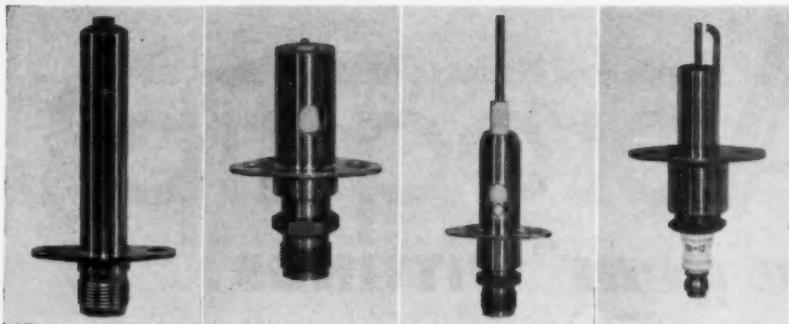
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PACING jet ignition system progress are (l. to r.) Champion plugs for vibrator, opposite polarity, high and low voltage condenser discharge systems.

Jet Ignition Developments Moving Fast

Field has shown four major stages in past decade, with no stopping point as yet in sight.

By JOSEPH S. MURPHY

JET ENGINE IGNITION, a center of great activity in engineering and development, has made remarkable progress from the simple mechanical vibrator and conventional electrode spark plugs used in the early Allison J33 engines of the Lockheed P-80.

Unlike its predecessor ignition system designs in reciprocating engines, which over the past 20 years have remained relatively unchanged in two basic types of systems, jet ignition has entered its fourth stage of major design change within 10 years.

The high tension systems of piston engines gave way, in the postwar years, to low tension designs. Jet ignition, on the other hand, has seen first the vibrator type system, then the 400 cycle transformer system, the opposite polarity system, and most recently the condensor discharge systems.

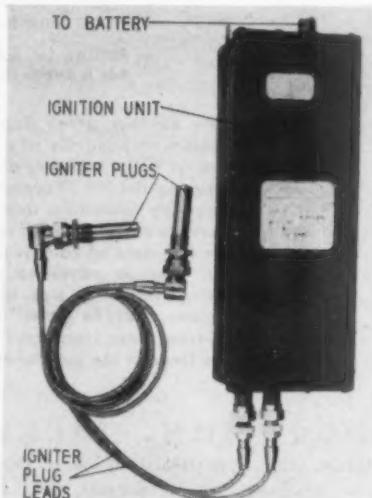
But the jet and piston engine systems shouldn't be compared too closely. Although they both serve to provide aircraft engine combustion, the similarity just about ends there. Where piston engine ignition is expected to meet a continuous operating requirement and fire as many as 56 spark plugs on a single engine, jet ignition is used only to start the engine, or restart it in flight after a flame-out, after which the system is shut down.

This is not meant to imply that engineering jet ignition is an overly simple task. The new requirements of jet operation at high speeds and high altitudes present an altogether new problem. Designing a system that will reignite a combustion chamber mixture under these conditions, preferably while located in the most turbulent spot in the combustor, poses a new challenge

to the ignition engineer, and his increasing ability to meet this challenge is reflected in the rapid progress made in the first 10 years of jet operation.

Early jet ignition, confined for the most part to the period from 1943 to 1946, consisted of a mechanical vibrator and conventional electrode spark plug. It was not radio-shielded and little attention was given to the effects of altitude and other adverse conditions of engine starting. This state of design was quickly superseded by completely radio-shielded ignition boxes, cables, and igniter plugs.

In many instances this system design improvement was accompanied by replacement of the vibrator with a 400-cycle transformer. Major use of this system, which prevailed from 1945 through 1951, was in the Allison J35



BENDIX SCINTILLA low voltage TLN-10 ignition system weighs seven pounds.

engine in such aircraft as the Republic F-84 and the Northrop F-89.

But this system had its limitation too, and as a result of high altitude starting requirements demanded for the General Electric J47 engine installation in the Convair B-36F bomber, the "opposite polarity" jet ignition system came into being.

In this system two single electrode igniter plugs are used in the jet combustion chamber. One electrode is at negative potential while the other is at positive potential, so that the voltage to ground is one-half the potential difference between the two igniters. This system has given excellent performance because of its wide spark gap and the advantageous position of the spark at the center of the combustion chamber.

Still in wide use on J47 engines today, the "opposite polarity" system also saw service on such airplanes as the North American F-86 and B-45, and the Boeing B-47.

But this stage of ignition system development also proved no final answer to the many demands of new jet engines, jets which presented different combustion chamber designs with higher compression ratios and called for a system which would assure engine starting at even lower temperatures and higher altitudes. With these new demands, the vibrator, the 400-cycle transformer, and the opposite polarity systems were soon made obsolete by the newer condensor discharge ignition system.

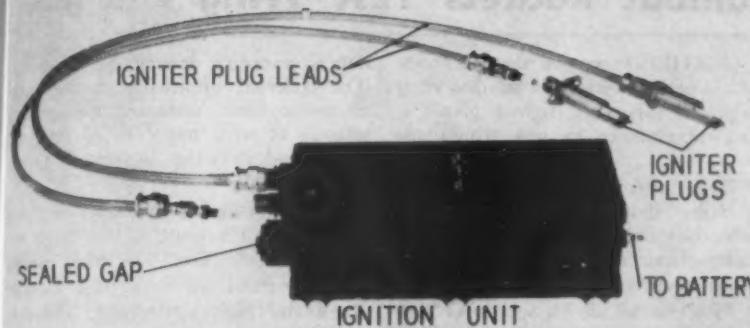
Predetermined Voltage

In this design the condensers are charged to a certain predetermined voltage and then discharged through a sealed gap or a breaker to the igniter spark plug gap. The result is a series of intense sparks of high energy and short duration, with the energy delivered to the spark depending on the size of the storage condenser, the voltage at which the condensers discharge, the induction, capacitance and resistance of the ignition system, and finally the igniter plug design.

But even in condenser discharge systems, development is already split along two lines, one called the "triggered" or high voltage system and another the low voltage system.

In the high voltage system now in use in such current jet engines as the Pratt & Whitney J57, a high voltage, low energy spark is used to ionize the igniter electrode gap, after which the high energy storage condensers discharge through the reduced resistance of the gap. The system is adaptable to conventional electrode igniter spark plugs, but better starting response is obtained with blunt ends in which the spark jumps from the center electrode

BENDIX IGNITION SYSTEM
TYPE TCN-5



HIGH VOLTAGE Bendix TCN-5 condenser discharge system weighs 10 pounds and is adapted for use with regular igniter plugs.

directly to the shell body, where gap spacing is generally in the range from 0.060" to 0.110".

With this advantage of using less complicated igniter plugs, the high voltage system has shown excellent starting performance under the most adverse conditions of high altitudes, low temperatures, and high velocities. But its one disadvantage, that of requiring a high voltage ionizing spark, points to its eventual displacement by the newer low-voltage condenser discharge system.

This low voltage system dispenses with the "triggering" spark of its high voltage counterpart among condenser discharge designs and uses voltages in the range of 800 to 3000 volts to discharge the condensers. Igniter plugs are able to spark at such low voltages because of the use of special semi-conducting material between the electrodes. The material causes ionization at the electrodes which in turn greatly reduces the resistance of the air to the arc discharge, and the low voltage spark is able to jump the gap. Gaps in this system are in the range of 0.010" to 0.035".

Advantages seen for the low voltage system include:

- Improved starting under the most adverse conditions.
- Reduced insulation of leads resulting from lower system voltages, a factor that becomes increasingly important as temperatures surrounding the engine increase in the trend toward higher compression ratios and increased speeds.
- Reduced altitude flashover requirements, another result of the lower voltages used.

According to Champion Spark Plug Co. engineer L. R. Lentz, who traced this system's growth, the development of satisfactory semi-conducting igniter plugs has delayed the com-

plete acceptance of low voltage condenser discharge systems for a year or more. Now, Lentz says, it is becoming evident that these plugs can be built with the same degree of uniformity and dependability as other types of spark plugs.

Lentz goes one step further and predicts that within a few years all jet engines will be using this new type ignition. At the present time virtually all new jet engines are being developed to include it, he points out, although problems of cost as well as interchangeability (and there seem to be many in the jet spark plug field) will probably prevent its adoption on present production engines.

The only major exception here is the present large scale program to refit the Allison J35 engine with the newer high voltage condenser discharge system, replacing the 400 cycle transformer type used until now.

The extent of non-interchangeability among jet ignition systems today is emphasized in present jet spark plug production at Champion, where some 19 different igniter plugs are being manufactured for 19 different engine applications, many of which have non-

similar mounting and terminal provisions.

In defense of this non-standardization at the present time, Allison's Fred Seitz, chairman of the Society of Automotive Engineers Ignition Research Council, agrees that there has been room for standardization in leads and mounting designs, and reports that progress is being made in this direction. Seitz, however, views any attempt at this time to standardize jet igniter plugs as to type, materials used, and penetration length as impairing the necessary and healthy development of better jet engine ignition and combustion systems. • • •

Books

GOVERNMENT CONTRACTS SIMPLIFIED, by George William Lupton,

Jr. Printed by The William Byrd Press, Inc., Richmond, Va., for the author. 579 pages. Price: \$10 for book plus first supplement.

Lawyer Lupton has done a remarkable job of compiling in one volume the diverse procurement regulations and policies relating to the Army, Navy, Air Force, General Services Administration, Atomic Energy Commission, and other government agencies with buying power. No less remarkable is the excellent job of indexing the thousands of items which he manages to compress into a readable reference book.

Throughout the volume Lupton's knowledge of the aviation industry and the relative importance of various segments is evident. This knowledge was obtained from the author's experience as assistant chief engineer for Douglas Aircraft Co. in the Middle East, as a consultant with the U. S. Air Force in settling up its small business clinics, and in his work with the airlines in the early period of non-scheduled airline operation.

Some readers may recall the author's earlier book, "Civil Aviation Law."

In each specific area of procurement interests Lupton outlines the historical scope of the agency, its contractual authorizations and regulations, and provides a step-by-step outline of how the businessman can do business with the agency.

Lupton's personal survey of the industry's attitude toward such a volume uncovered considerable interest in the undertaking providing that some means of keeping the work up to date was possible. To do this the author has started a digest-sized supplement which will be put out monthly dealing with important changes. The first of these well organized supplements is included with the price of the book.

The book is complete and worthwhile without future supplements, but for those with detailed business interests the supplements will be priced at \$5 each.

... WDP



IGNITION EXCITER for capacitor discharge type jet system built by General Electric Co. weighs 3 lbs. 4 oz. and is approved for four production jet engines.



VEHICLE for tests is 74"-long rocket, of which 20" is taken up by a spike on the nose, to spare the instruments unnecessary shock upon landing. Cameras are visible jutting from body near nose.

Combat Rockets Test Wing Designs

LOCKHEED reports that its commitment to very thin, straight wing design for supersonic fighter planes is being substantiated by new wing-shape tests.

The Burbank manufacturer is testing wing shapes and structures for double-the-speed-of-sound jet fighters by attaching scale models to five-inch high velocity rockets.

"Rockets which hit speeds as high as 1500 mph give us test flights difficult to achieve in any other way," Lockheed's chief engineer, C. L. (Kelly) Johnson, reports.

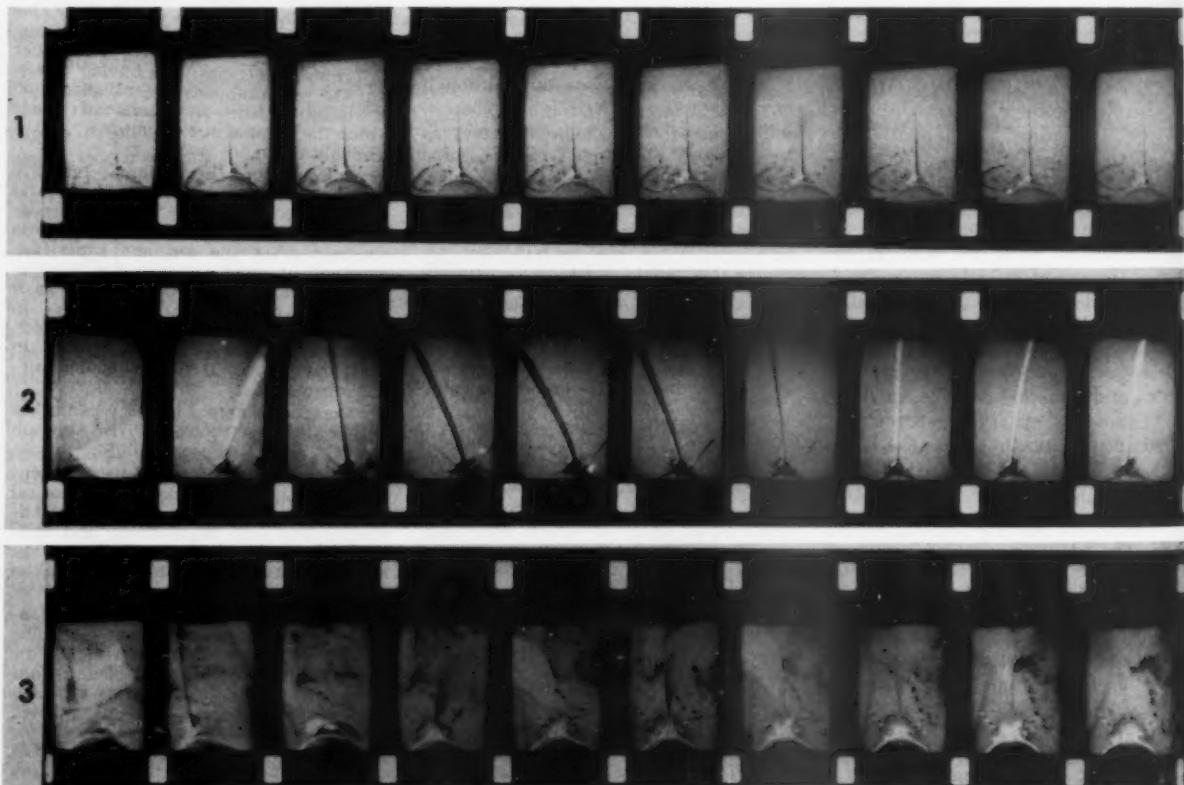
Experiments on 50 different wing models have been conducted in isolated desert test bases over the past nine months. More are scheduled.

Results are determined from in-flight movies filmed by cameras packed into the rocket nose and from electronic apparatus which collects and radios test

data to recording devices on the ground. The collected information is fed into electronic brain machines for detailed analysis of what happened to both the rocket and its wings at various speeds and stresses.

The method is working out particularly well because of the high velocity of the rockets. The wing models have to stand up under the blast of speed and high acceleration, and they also have to prove themselves at low altitude where air loading is most severe, Johnson says.

For some time now Lockheed's Johnson has been regarded as the industry's most articulate proponent of the thin, straight wing configuration for supersonic fighters. Lockheed has a new high velocity air superiority fighter, the XF-104, under construction. It is generally understood to incorporate a thin, straight wing. • • •



FILM FROM TEST ROCKETS shows reactions of three different wing designs during high speed flight. When viewed from the right side, the pictures above will show the progressive reactions, with the nearest frame showing the wing in the static condition and the frame at the numbered end of the strip showing the end of the film sequence. Strip Number One shows a satisfactory thin, straight wing. Strip Two shows a straight wing made highly flexible. Strip Three shows a less flexible swept wing, which reacted violently before failing.

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West Coast Talk

By Fred S. Hunter

WHAT'S happened to the Douglas DC-8 jet transport? Year ago this time it was a red hot topic of discussion. Then the talk subsided. Now you hear an occasional whisper, not much more. But don't let this appearance of repose deceive you. There is nothing the matter with the DC-8 project that a good, solid commercial engine won't fix in a hurry.

Only suitable power plant immediately available is P & W's J57. This is a fine engine and the Air Force loves it. But it's still strictly a military engine. It's being proved by the military in planes like Boeing's B-52 bomber, North American Aviation's F-100 fighter, and Convair's F-102 interceptor coming up.

But airlines don't play that way. Their engines have to be proved first. They want warranties. P & W needs more experience with the engine to be able to tell how far it can go in writing up warranties for commercial customers.

Douglas subscribes to the design philosophy that you can't make a good commercial transport out of a bomber. From its long experience in the transport market, it knows it isn't going to get very far asking airlines to invest \$4,000,000 or \$5,000,000 per copy in a new plane unless it can show attractive operating economies and proved performance. For the DC-8 Douglas wants an engine that will carry a 1000-hour warranty; or at least be within shooting distance of that figure.

When the day comes that P & W is in a position to talk in commercial terms on the J57 you can take a ticket it won't be long before they'll be releasing shop orders on the prototype in Santa Monica. Meanwhile, Douglas continues design development on its jet transport, and it is still making the necessary appropriations to pursue the project.

•

Northrop Aircraft is paying a re-location allowance to employees transferring from Hawthorne or Ontario to the new flight test facility at Palmdale. It calls for \$10 per day for the employee, another \$10 per day for his wife and \$5 per day for each additional member of the immediate family for a period of 30 calendar days. Northrop also pays the moving bill on 6000 pounds of household goods.

•

WEST COAST PERSONALITIES—Arthur S. Billings, quality control manager at Ryan, was landing signal officer on the Navy's first aircraft carrier, the Langley . . . Ralph Ellinger, TWA's west coast engineering manager stationed at Lockheed, was TWA's inspector on the Douglas DC-2 20 years ago . . . Lila West, formerly secretary to Bert Holloway at Lockheed, has moved up to secretary to Gen. E. R. Quesada, vice president and general manager of the new guided missile division . . . Jack Anderson at Marquardt knocked off his 25th year in the aircraft business last month.

•

WEST COAST MISCELLANY—American Airlines' air freight billings at its Los Angeles International Airport office are now running \$150,000 a day . . . Lockheed should be about ready to announce its Lockheed Test Vehicle, LTV for short, which is used for such work as testing ramjet power plants . . . It'll be interesting to see how things work out in San Diego where new ticket office lineup will put American Airlines and North American Airlines across from one another at the entrance to the U. S. Grant Hotel . . . W. C. Jordan has spent as much time or more in Washington and Dayton since taking over as vice president and general manager of Hughes Aircraft, but Culver City expects the turn of the year to mark more activity on the home front.

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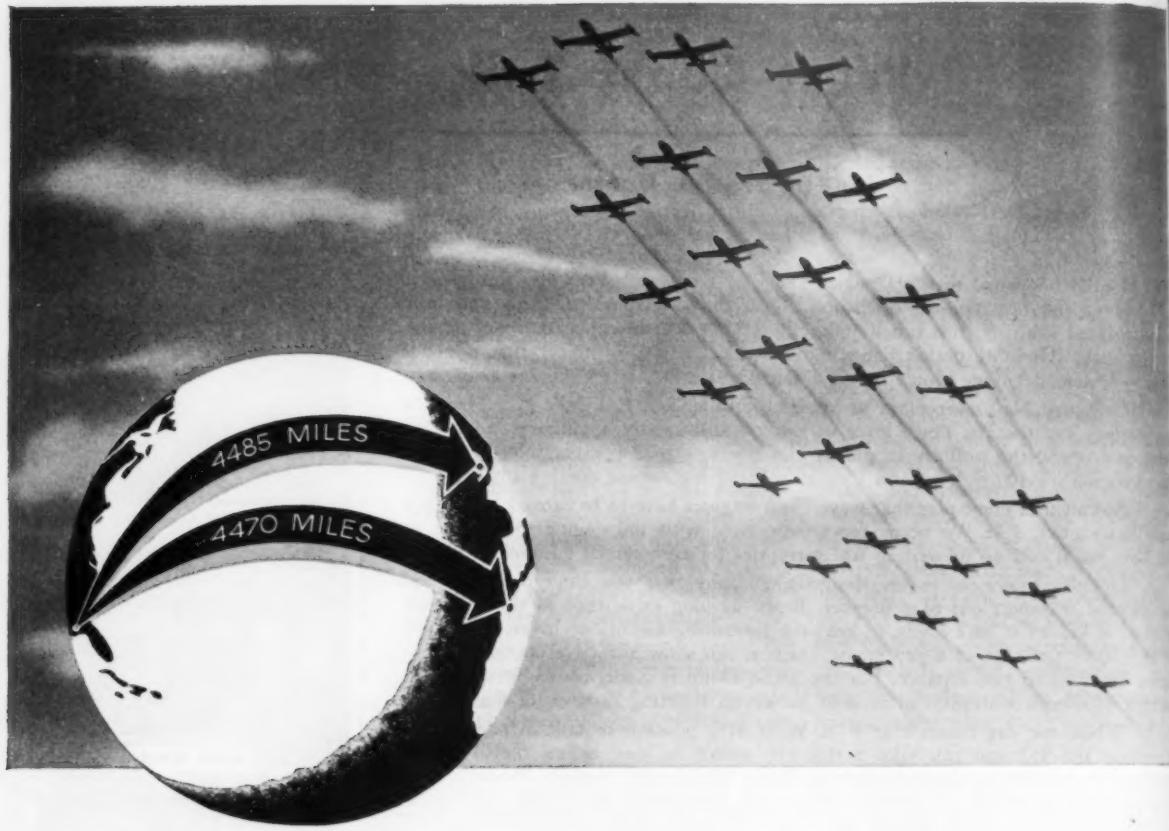
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Longest nonstop Jet fighter flights

Colonel Dave Schilling's 31st Strategic Fighter Wing and the 508th Strategic Fighter Wing commanded by Colonel Cy Wilson have each set another American airpower record.

The 31st made their mass jet flight across the central Atlantic—4,470 miles over water from Turner Air Force Base in Georgia to Nouasseur, French Morocco.

The 508th flew 4,485 miles nonstop from Turner to Lakenheath, England—the longest transocean

nonstop jet fighter flight ever made. As in earlier record-breaking mass refueling flights, both wings flew Allison-powered Republic F-84G Thunderjets. The 508th was in the air 11 hours and 20 minutes; the 31st landed after 10 hours and 21 minutes. Many Air Force men—crew chiefs, pilots, mechanics—helped write this U. S. jet fighter power record in the books. Their efforts, backed up by Allison's engineering, design and production skill, have scored another Allison power record in the air.



Allison

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Books

JANE'S ALL THE WORLD'S AIRCRAFT 1953-54

Compiled and edited by Leonard Bridgman. McGraw-Hill Publishing Co., 330 West 42 Street, New York 36, N. Y. 247 pp.

In his preface, Leonard Bridgman points out that Jane's has been published since only six years after the Wrights' first flight and adds, truly, that the complete set is a unique record of aeronautical progress. First edition, "All the World's Air-Ships" in 1909 had 374 pages and cost one quarter as much as today's 247 page edition.

The present edition suffers from the lack of new airplanes and engines revealed during the year. A fairly close study shows that only the Convair Sea Dart, Gruman S2F, Handley Page Victor, and Short SB-5 are new among major types. Europe shows a few new light planes and trainers—with emphasis on Harvard replacements.

Nipponese revival can be seen in three "copyist" trainers. Russia news is scant, though a motorless helicopter trainer, the Kupfer, is startling. New drawings show a straight-wing, four-motor version of the mysterious TUG-75, a swept twin-pod bomber with a mixture of Junkers and Boeing characteristics.

Much revision and checking, and more than 400 new photos have gone into this edition and make it, as always, indispensable to those actively engaged in aviation.

... JHS

AVIATION FACTS AND FIGURES

1953, edited by Rudolph Modley and Thomas J. Cawley of the Aircraft Industries Association. Lincoln Press, Inc., Washington, D. C. 224 pages. Price \$5.00.

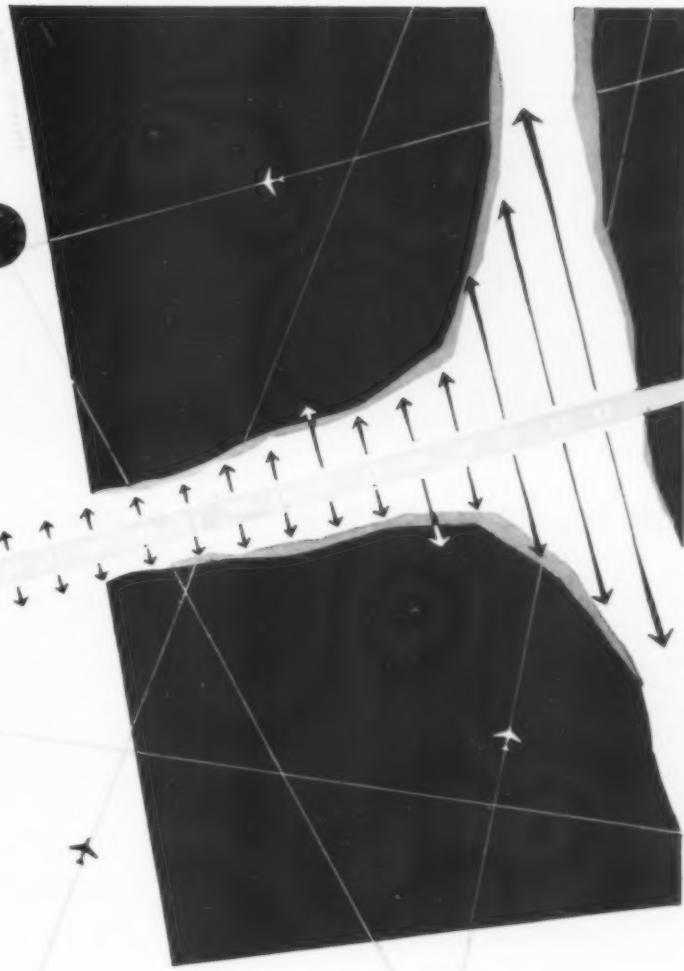
This official AIA publication presents in easy-to-follow tables and explanatory notes historical and current data on all segments of the aircraft industry, including plant facilities, output, labor, finances, military appropriations for air-power, airline and air traffic trends, utility planes, exports, foreign aviation, airports and airways, civil and military aviation training, other types of transportation, and research and development appropriations and personnel.

... RML

Obituary

WILLIAM BERNARD ZIFF, 55, founder and chairman of the board of Ziff-Davis Publishing Co., publishers of technical publications in aviation and other fields, died on December 20 of acute coronary thrombosis at his suite at the Ritz Tower Hotel in New York. The body was interred at Arlington National Cemetery.

The deceased was a World War I pilot and was noted for his work on camouflage from the air. He had served as an aeronautics adviser to the U.S. and British governments.



growth

Due to our long experience, the demand for our engineering services in designing new precision devices and systems has increased tremendously. Our activities now embrace the four distinct yet allied fields of

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New Products



VHF Ground Station Receiver by Bendix

Bendix Radio Communications, Division of Bendix Aviation Corp., has announced production of a new VHF fixed-frequency ground station receiver for airline type use. It is designated the model RG-9A and is the forerunner of a receiver-transmitter combination to be made available soon with the introduction of a Bendix TG-19, 50 watt VHF transmitter.

The model RG-9A weighs less than 20 pounds and operates in the range from 118 to 136 megacycles. By changing one fixed capacitor, this range can be extended to 152 mc.

A single-channel, crystal-controlled unit, the RG-9A may be used for either amplitude-modulated or modulated CW reception. Adjacent channel rejection is said to be in excess of 100 db with 50 kc channel spacing; sensitivity is 2.5 microvolts for 66 decibels signal-plus-noise-to-

noise ratio. Spurious responses are down more than 90 db.

Primary power requirements for the new Bendix unit are 117 volt, 50-60 cycle alternating current. Chassis is of dish-type construction to fit any 19-inch relay rack. Units will be scheduled for delivery starting this month and first orders have been placed by three major U. S. airlines.

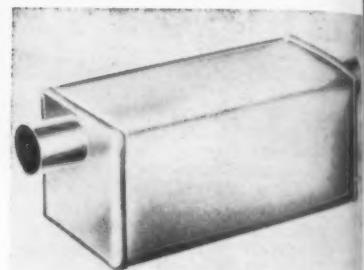
Address: Bendix Radio Communications, Division of Bendix Aviation Corp., Dept. AAP, Baltimore 4, Md.

Connectors. New lightweight multiple contact connectors for aircraft electronics installations, which offer a "floating" contact design for ease of engagement and disconnect, are being produced by Gorn Electronics, Division of Gorn Electric Co.

Connectors are available with from

one to 100 precision-machined contacts that are gold-plated over silver for maximum conductivity and corrosion resistance.

Address: Gorn Electronics, Div. of Gorn Electric Co., Dept. AAP, Main St., Stamford, Conn.



Muffler. A new lightweight muffler which fits into any existing jet aircraft air conditioning system will effect an overall noise reduction up to 23 decibels, according to its producer, Industrial Sound Control, Inc., of Hartford, Conn.

Designed to reduce the whine of jet cockpit air conditioning systems, the new high velocity air line muffler measures 5" square by 10" long, and weighs only 3½ pounds. It is constructed of steel-lined aluminum, combines effective noise reduction with minimum pressure drop, and will operate at temperatures of 500° F. and above.

Address: Industrial Sound Control, Inc., Dept. AAP, Hartford, Conn.

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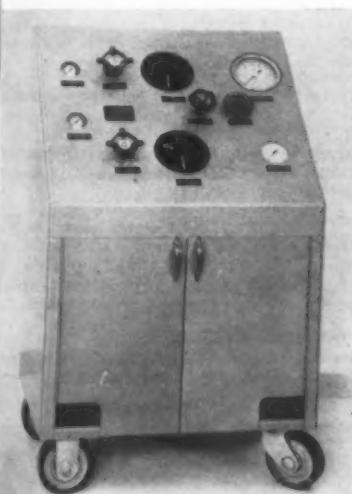
Technical Literature



Power Supply. Airborne power supplies in a new series with ratings from 25 to 500 amperes at 28 volts have been introduced by Inet, Inc. Featuring complete elimination of vacuum tubes, the new Inet units use selenium rectifiers and magnetic amplifiers to insure trouble-free operation, eliminate warm-up time, and cut parts replacements.

Operation is from 200 volt, 400 cycle, 3-phase a-c input. Output voltage regulation is said to be better than \pm one percent from no load to full load. Guaranteed life is 1000 hours with 2000 hours to be easily expected, manufacturer states.

Address: Inet, Inc., Dept. AAP, 8655 So. Main St., Los Angeles 3, Calif.



Pressure Test. This new test unit for measuring aircraft cabin pressurization leakage affords a fast, positive and direct reading of cabin leakage on a single indicator, according to its designer, Engineering Associates of Burbank, Calif. Utilizing a direct reading measurement of airflow into an aircraft cabin supplied from an external source, at equilibrium conditions this airflow rate is equal to the leakage.

Two models are being produced, a mobile unit (see photo) for production line use, and a suitcase version for field service work.

Address: Engineering Associates, Dept. AAP, 1128 North Hollywood Way, Burbank, Calif.

JANUARY 4, 1954

PANEL INSTRUMENTS: Two technical bulletins have been issued by DeJur-Amsco Corp., 45-01 Northern Blvd., Long Island City 1, N. Y., to present schematic drawings, specifications, tables, and special features for the DeJur 1 1/2" square Model 112 panel instruments for aircraft, guided missiles, and portable equipment.

FORGING FILM: "5000 Years of Forging" is a 20-minute, 16 mm. sound film produced by the Utica Drop Forge & Tool Corp., Utica 4, N. Y., dealing with history and mechanical progress of forging.

GEAR SPEEDERS: Bulletin MS-10 briefly describes Michigan gear speeders Models 1126, 1126A, 1127B, and 1129 used for gear inspection, as designed by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

LOGARITHM TABLE: National Bureau of Standards has prepared the Table of Natural Logarithms for Arguments Between Zero and Five to Sixteen Decimal Places. Available from the U. S. Government Printing Office, Washington 25, D. C. for \$3.25.

SERVO VALVES: Bulletin 500 presents details on the Model 500 series servo valves available to control maximum desired output flow as specified from 0.5 to 8.0 gpm in hydraulic systems of from 1000 to 3000 psi. The Moog Valve Co., Inc., Proner Airport, East Aurora, N. Y.

ENGINE ACCESSORIES: A 24-page booklet describes development, testing and production of aircraft engine accessories at Parker Appliance Co., 17325 Euclid Ave., Cleveland, O.

PILOT HANDBOOK: CAA Technical Manual No. 102 titled "Pilots' Radio Handbook" describes operational use of all navigational aids available to pilots with two-way radio equipment, replacing Manual No. 29. Available from the U. S. Government Printing Office, Washington 25, D. C. at 45¢ per copy.

WAVEGUIDE ENGINEERING: "Microwave Nomograms and Charts," a 20-page booklet of waveguide engineering data and curves, is published by Airtex, Inc., Dept. H., Linden, N. J.

SILICONE RESINS: A summary sheet, prepared by Dow Corning Corp., Midland, Mich., compares the properties and performance of leading silicon electrical insulating resins, reviewing five coating and impregnating varnishes, an adhesive, and six bonding and laminating resins.

AIRCRAFT MOTORS: A new eight-page bulletin, designated GEC-988, deals with selection and application of aircraft and ordnance motors, General Electric Co., Schenectady 5, N. Y.

WELDING FILM: A 28-minute, 16 mm. color film titled "Welding Advances with Aluminum," by the Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa., presents a demonstration of the latest techniques in the welding of aluminum pressure vessels.

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Group Two Carriers Ask Lower Rates

A Post Office Department proposal to begin shipping mail on January 1 via the airline with the lowest mail service rate, threw CAB and a segment of the certificated industry into a turmoil over the recent holidays.

Immediately affected were the six airlines classified as "Group II" carriers by CAB in its subsidy separation studies—Capital, Delta-C&S, National, Braniff, Northwest, and Western. They carried mail at a 53¢ per ton-mile service rate. The PO plan was to give mail to the "Big Four" at their 45¢ rate over most competitive segments.

Rather than suffer the loss of revenue which would result from such diversion, the six Group II carriers petitioned CAB for reductions in service rates on competitive segments to 45¢. Capital actually asked for 45¢ system-wide rates rather than "discriminate" against its "non-competitive" segments.

Delta-C&S asked, in addition to the reduction to 45¢ on competitive segments, for an increase from 53¢ to 57¢ per ton-mile on other segments to equalize total mail pay.

National requested 45¢ on all routes except its Havana route, which it suggested be kept at 53¢. The other three carriers want 45¢ on competitive segments and maintenance of the 53¢ rate on others.

Meanwhile, in the international field, Pan American World Airways petitioned the Board for equalization of its service rates between the mainland and Honolulu and between the U. S. and Puerto Rico with current 45¢ rates of United and Eastern, respectively.

Pan Am currently gets a 59¢ rate to Puerto Rico and a 67¢ rate to Honolulu. There was no indication, however, that the PO's policy of using lowest-rated carriers would be applied in the international field as early as January 1.

Although consenting to and requesting reductions to 45¢, none of the airlines conceded the wisdom of the PO-forced move. Indications pointed to a possible CAB investigation aimed at a new service mail rate structure for the industry.

Board Sends Suggestions to Local Lines

The cooperative effort of CAB and the local service airline industry to improve the economic position of the local lines, evidenced at Christmas week meetings in Washington, resulted initially in these recommendations which were given in individual CAB letters to the local lines' presidents:

- **Wages and Salaries** (responsible for 55% of total cost level increases in 1952): "It is the Board's recommendation that you work out a plan which would set up immediate coordination between representatives of the carriers and of the employee groups concerned, for the specific purpose of coming to an understanding on the question of the extent that subsidized operations of a local service character, on an experimental basis and during a developmental period, and under circumstances of very limited traffic potential, can support, without increased worker productivity, continuing salary and wage increases."

- **Materials, Repairs, and Overhauls** (responsible for about 25% of

cost level increase): "It is the Board's recommendation that you work out a plan which would allow the local service carriers to combine, for the purpose of setting up a purchasing corporation to bargain collectively for the purchase of materials, supplies, overhauls, repairs, etc. It is the Board's view that efficiencies and economies would at once result from a practical plan carried out toward the end recommended."

- **Landing Fees and Ground Rentals**: Proposed that "the local service carriers immediately work together to set up an acceptable schedule of landing fees and acceptable standards for ground rental rates that would have applicability throughout the country."

The letters, signed by Chairman Oswald Ryan, promised that "the Board will assist you, to the extent of its powers, in carrying out the plans which we have requested from you, and in carrying out any other plans which you may propose and agree on to improve the financial position of the local service industry."

CAB MISCELLANY

Special Committee for Nation's Passenger-Carrying Railroads opposes CAB's proposed three-month extension of interim operating standards for C-46 aircraft claiming "4½ years is sufficient time for compliance."

Capital Airlines proposes its first "day coach service" between Chicago-New York and Detroit-Washington, effective January 14, with 64-seat DC-4 equipment to be used, subject to CAB approval.

CAB News

AS OF NOW

The trend of recent years toward omnibus CAB proceedings is not likely to be reversed in 1954. Topping the list are two major route proceedings and the large irregular carrier investigation, none of which promise to be completed for at least another year.

One of the route cases, the **Delta Service Case**, should get to hearings in April. The other, the **Southwest-Northeast Case**, is still in the pleadings stage and an approximate hearing time is uncertain.

The **Large Irregular Investigation** was instituted 28 months ago, hearings have been on for 16 months, and there is no end in sight. Even a final decision in 1955 appears remote at this stage.

A new merger case involving **Pioneer, Continental, and Braniff**, has emerged upon the scene and should occupy most of the year. Also, a strong possibility is an over all **Mail Rate Investigation** aimed at possible re-alignment of the airlines' service mail structure.

RECENT CAB DECISIONS

- **Delta-C&S Air Lines** authorized to suspend service for one year at Kingston, Jamaica, coincident with new service to Montego Bay, Jamaica.

- **Línea Aérea Taca de Venezuela** C. A. application for U.S.-Venezuelan foreign air carrier permit denied after seven years as carrier failed to produce evidence of official designation by Venezuelan government.

- **Jacob Freed Adelman** d/b/a **Hemisphere Air Transport**, turned down on application to transfer letter of registration to new corporation—**Hemisphere Airlines, Inc.**

- **Trans-Pacific Airlines** and **Hawaiian Airlines** mail rate proceedings consolidated for joint hearings.

CAB CALENDAR

Jan. 12—Hearing in United Air Lines Mail Rate Case (Hawaiian operations). Washington, D. C. Docket 2813.

Jan. 18—Hearing in Lake Central Acquisition Case. Washington, D. C. Docket 5770 et al.

Jan. 27—Hearing in Air Freight Forwarder Investigation. Washington, D. C. Docket 5947 et al.

Feb. 1—Hearing in South Atlantic Renewal Case (Pan American World Airways). Washington, D. C. Docket 5818.

Apr. 5—Hearing in Denver Service Case (TWA, et al.) Washington, D. C. Docket 1841 et al.



Airline Commentary

By Eric Bramley

OVER a year ago an airline employee, experienced in reservations and ticket office work, resigned. When he left, he allegedly took with him 51 unused round-trip tickets and somehow picked up 25 more later. The loss wasn't discovered in an audit; whether it was oversight or whether some loophole was found in auditing procedures isn't clear.

The tickets, correctly made out and validated, and covering long trips, began appearing for refunds, which were made without question—several thousand dollars worth (tickets were being validated in early morning hours when there was only one agent on the airport counter; when he went into the back room someone leaned over the counter and used the validating machine). Four tickets were actually used for transportation—written on another carrier—and when this carrier questioned a routing for a partial refund it was first discovered that the tickets had never been sold in the first place.

While the airline was still forming plans to catch the culprits, an agent, who had only the vaguest hint that something was wrong but who nevertheless had determined to check refunds carefully, was presented with a ticket for refund. It was made out too correctly, cross-referenced for fare construction when it shouldn't have been. She warned the manager, who called the FBI, and the man was taken into custody. Later, the former employee was picked up.

This experience is related in some detail because it may prove helpful to other carriers. It could happen to anyone (best evidence that the plan was good is that no one was in a hurry; only 22 tickets were refunded in the first year). How are your auditing and ticket-checking procedures?

One of the finest presentations of where and how to look for airline business was given at the Delta-C&S sales conference by Jack Howe, the company's Houston district sales manager. Writing his experience in the form of a "Dragnet" skit, he described an actual visit to a business firm in answer to a complaint about a mishandled bag. By the time he left, he had talked with officials about an air travel plan, using travel as prizes in sales contests, expediting cargo shipments, mail, and a number of other items. It was a top-notch job; Delta-C&S should distribute Jack's paper to all its salesmen.

Bob Reeves, president of Reeve Aleutian Airways, Alaska, is being razed about issuing "annual passes" to his friends for transportation between Shemya and Attu, way out on the Aleutian Chain. Most such "passes" issued in the industry carry small-print restrictions ("good only on the sixth Thursday of each month," etc.) that make them unusable. Bob, however, didn't surround his with restrictions, and friends have jokingly threatened to tip off the CAB. Chances of any one attempting to use the pass are extremely remote; it would cost a small fortune to get from the U. S. to Shemya, just to try to ride 35 miles free to Attu!

ODDS AND ENDS: American Airlines has discontinued transcontinental DC-6 sleeper service. DC-7's speed does away with need for berths, it says . . . Frank Howell, TWA sales manager in Madrid, is going to town. He was recently decorated with the "Orden de Merito Civil" by the Spanish government, and has just written a book, "Let's Visit Spain," to be published next month by Crowell Publishing Co. . . . Delta-C&S is latest airline to try the Burroughs Ticketeer. Western has the ticket machine at most big stations; United and TWA are testing . . . Midwest Travel Writers Association gave Pan American its grand award for "best travel promotion in world" for 1953 . . . Congratulations to Goodyear Tire & Rubber Co. for devoting its one-hour television program on December 20 to the 50th Anniversary of Powered Flight . . .



The following employes recently completed 20 years or more of service in the aviation industry:

- Margaret L. Barry, American Airlines. Reservation agent, Boston. 25 years.
- L. S. Andrews, American Airlines. Instructor, operations, Los Angeles. 25 years.
- C. W. Jacob, American Airlines. Vice president, New York. 25 years.
- J. H. Mangham, American Airlines. Captain, Fort Worth. 25 years.
- Mary Duden, American Airlines. Secretary, office of the president, New York. 25 years.
- J. B. Glass, American Airlines. Captain, San Francisco. 25 years.
- B. B. Bryan, American Airlines. Purchasing representative, Los Angeles. 25 years.
- P. L. Carpenter, American Airlines. Captain, Los Angeles. 25 years.
- F. J. Hoyt, American Airlines. General foreman, Chicago. 25 years.
- D. W. Ledbetter, American Airlines. Captain, San Francisco. 25 years.
- S. P. Bitner, American Airlines. Captain, Los Angeles. 25 years.

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Model PERFORMANCE!

A Toast to an Eclipse-Pioneer 1589-1C carbon pile type voltage regulator. Now, there's one for the New Year book! Even Auburn-Haired, Brown-Eyed, Sequin-Swathed, 25-Year-Old, 125-Lb., 5'5" Betty Williams seems a mite overcome by it all. Pilots, however, will be quick to admit that 1954 is the signal for doing away with unreliable 10-year-old war surplus in their aircraft and replacing it with Eclipse-Pioneer's latest accessories and instruments. The complete Eclipse-Pioneer line, factory-new and fully-warranted, is available through its distributor, the Southwest Airmotive Sales Department. SAC also is your authorized Eclipse-Pioneer service center.



People

MANUFACTURING

Philip E. Spindell and Paul Mueller have been elected vice presidents of Template Reproduction and Engineering Co. of Philadelphia. Spindell, who joined TRECO from Piasecki Helicopter Corp., will handle engineering, and Mueller, who has served TRECO in various capacities for the last eight years, will have manufacturing.

Adelbert H. Loux has been named general sales manager of Flexible Tubing Corp.

Kenneth L. Vore, formerly director of transportation in the office of the Secretary of Defense, has succeeded Wesley H. Lees as general traffic manager of Westinghouse Electric Corp. Lees has been appointed assistant to the vice president.

I. F. Richardson, Jr., has moved from Bendix Aviation Corp.'s division in South Bend where he was manager of aircraft equipment sales and service to the assistant general manager position of Bendix's Kansas City Division.

Matthew J. Bentley, Aeroquip Corp. vice president of manufacturing since February, 1953, has been appointed the firm's vice president and general manager. In his new post, Bentley will be responsible for coordinating sales, engineering and manufacturing functions including management of all subsidiaries.



Bachrach



Sharpe

AIRLINES

Frank Sharpe has been promoted from assistant to the general traffic manager to general sales manager for Eastern Air Lines.

R. H. Ahrens, vice president of personnel for United Air Lines, has been elected chairman of the board of directors of the Airlines Personnel Relations Conference.

Elmer J. Basey has been appointed U. S. sales manager of Japan Air Lines. Prior to joining the Japanese flag carrier, Basey was Los Angeles sales manager for Philippine Air Lines, a post now filled by Robert Cann.

Frank M. Briggs has been named passenger service manager for Pan American World Airways' Latin American Division, replacing Charles E. Shoemaker who has been given a special assignment.

Lee R. Urquhart has replaced Charles E. Moffat as superintendent of purchasing and stores for Pioneer Air Lines.

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INTERNATIONAL AVIATION

Edited by Anthony Vandyk



INTERCOM

"The whole problem of take-off may be revolutionized by the incorporation of jet thrust into the lifting system."

With these recently spoken words, British aviation pioneer Sir Frederick Handley Page mentioned a subject that had hitherto been a top secret on both sides of the Atlantic. At a conference on jet-lift not long ago security precautions were almost as great as those for the explosion of an atomic weapon.

Sir Frederick gave a hint of what design teams are striving to attain when he said that "eventually, we may even come to the stage where the power units are used to remove the wake produced at the source of its production on wings and fuselage, leaving only a small modicum of power required at cruising to overcome induced drag."

The results of basic research to date indicate that substantial improvements in performance, due to drag reduction or lift augmentation, can be obtained through the by-passing of power to control the boundary layer and, hence, the lift of the wing. Boundary layer control, Sir Frederick believes, will have an even more profound effect on the future of aviation than the introduction of metal aircraft construction in the 1930's.

Increased competition for Scandinavian Airlines System will come in a few months time when Pan American World Airways inauguates direct DC-6B flights from New York and Chicago to the Scandinavian countries. At the moment PAA passengers change aircraft at London and fly in DC-4 equipment to Denmark, Norway or Sweden.

SAS will also have competition from Air France starting March 15 when the French airline re-enters Scandinavia after several years' absence. Initially there will be a Viscount service from Paris to Copenhagen and Stockholm, but in the summer Air France will introduce a Comet non-stop flight between the French and Swedish capitals, taking 1 hour 45 minutes, against the 4 hours 40 minutes of the SAS DC-6B's which fly via Copenhagen.

East Germany to Build the MiG-15

Plans to build the MiG-15 jet fighter are included in an aircraft industry rehabilitation and production program now being prepared for the East German government. The program is being drafted by a group of German engineers—most of whom were in the Soviet Union from 1946 to 1950—working in Sonnenstein castle, Pirna.

The MiG-15 program will involve the German production of the Russian

VK-1 jet engine (sometimes known as the RD-45A or M-45A) under the designation of T-90. The VK-1 is a copy of the Rolls-Royce Nene. Production of the engine is scheduled to start at Dessau, the former headquarters of the Junkers company, early this year.

Test equipment in connection with the VK-1 program will also be used for improved versions of the Junkers Jumo 004 and BMW 018 jet engines.

Hildred Predicts 10% Traffic Rise

The world's scheduled airlines anticipated a 10% increase in traffic during 1954, but cannot expect a fully equivalent rise in their revenues, according to a year-end review by Sir William P. Hildred, director-general of the International Air Transport Association.

"Creative" fares and rates will help swell the volume of passengers and cargo next year, but these same lower fares, combined with extensive re-equipment costs and decreased compensation for carrying air mail will keep the bal-

ance of airline finances "generally precarious," Sir William said.

In 1954 the IATA member airlines will probably put into operation about 300 new aircraft, representing an investment of upwards of \$200 million. This is the equivalent of 10% of the existing scheduled airline fleet.

In 1953 the airlines of the world carried an estimated 50 million passengers over a distance of 28,000 million passenger-miles. International air cargo exceeded the 685 million ton-mile mark. International air mail totaled some 190 million ton-miles.

Record Gross Predicted For Canada

The 1953 gross for Canada's aviation industry (manufacturing and transport) should exceed \$400 million for a record high peacetime mark, Canada's Air Industries and Transport Association predicts, adding that the figure should be within \$45 million of total

revenues for World War II's peak year (\$446 million in 1944).

Last year, aviation grossed \$342,280,000 to rank ninth among the nation's industries in dollar value of products. Some 75% of this year's gross will go to manufacturers.



Payen P.49, French delta aircraft, will soon start its flight tests. The wooden aircraft is powered by a Turbomeca Palas engine.

INTERNATIONAL AVIATION

MANUFACTURING

BRITAIN: Vickers has switched Viscount production from its Weybridge plant to Hurn, where output will soon increase to four aircraft monthly and eight by 1955. Each Viscount will take about five weeks to build. The Weybridge plant will be used to produce the Valiant jet bomber.

The de Havilland Comets II and III are to have a redesigned wing leading edge which will improve slow-flying, take-off, and landing qualities. Tests have shown that even with the tail skid in contact with the runway during take-off it is impossible to get the new wing into the stalled position. A new larger and lighter window than the Mark I's is to be fitted to the Comets II and III.

JAPAN: Japanese license production of the Lockheed T-33 jet trainer is likely to be undertaken by Kawasaki Aircraft Company which is to result from the merger next month of Kawasaki Machine Industry and Kawasaki Gifu. The aircraft will be bought for the embryo Japanese Air Force, which will initially use T-33's obtained direct from Lockheed.

FRANCE: Procurement of the following aircraft is provided for in the 1954 military budget: 70 SNCASO Vautour jet bombers; 150 Dassault Mystere IVB fighters; an additional 40 Nord 2501 Noratlas cargo transports; 100 Fouga 170R Magister jet trainers; and 15 Max Holste MH 1521 Broussard single-engine transports.

MILITARY

BRITAIN: Last Avro Lancaster has been retired by the RAF. It belonged to a photo survey squadron which has now been re-equipped with English Electric Canberras.

FRANCE: French Air Force will be boosted to a strength of 1000 combat planes under the 1954 budget despite an overall 13% drop in French military expenditure.

SOUTH AFRICA: All future air force pilot training will

be handled by the SAAF. Contracts with private flying clubs for primary training are to be terminated.

BELGIUM: Belgian Air Force is currently moving its advanced training school from Belgium to Kamina, Belgian Congo. Some of the training aircraft are being transported to Africa in Fairchild C-119's.

GREECE: Greek Air Force now has 400 combat aircraft and 500 pilots, against 100 planes and 200 pilots three years ago.

SWEDEN: Sale of 25 DH Vampire I jet fighters from Swedish Air Force surplus is in progress. More than 30 surplus aircraft have been sold by the air force since the war.

TRANSPORT

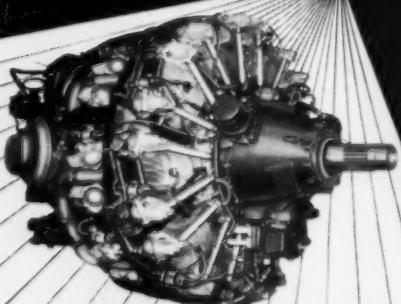
CANADA: Trans-Canada Air Lines planned to open a service to Mexico City via Tampa on January 2 following CAB agreement to issue a "six-month renewable permit" for the operation. TCA will start domestic coach service with 57-seat North Stars on February 1.

BRITAIN: BOAC will introduce Comet service to Nairobi, Kenya, in April. A thrice-weekly service between Miami and Kingston, Jamaica, via Contego Bay, will be inaugurated on January 16 with Vickers Vikings chartered from British West Indian Airways.

SWITZERLAND: Swissair is seeking to call at London on its service to New York. President Walter Berchtold has said Switzerland may denounce its air agreement with the United Kingdom if the carrier does not receive reciprocity for fifth freedom rights according to BEA and BOAC at Swiss airports.

AUSTRALIA: Australian National Airways, privately owned carrier, is seeking to operate between Australia and New Zealand. This route is now the monopoly of Tasman Empire Airways, which is about to be reorganized. ANA has long sought freedom of opportunity with state-owned air lines on overseas in addition to domestic routes.

23 LEADING WORLD AIRLINES HAVE SELECTED TURBO COMPOUNDS




QANTAS



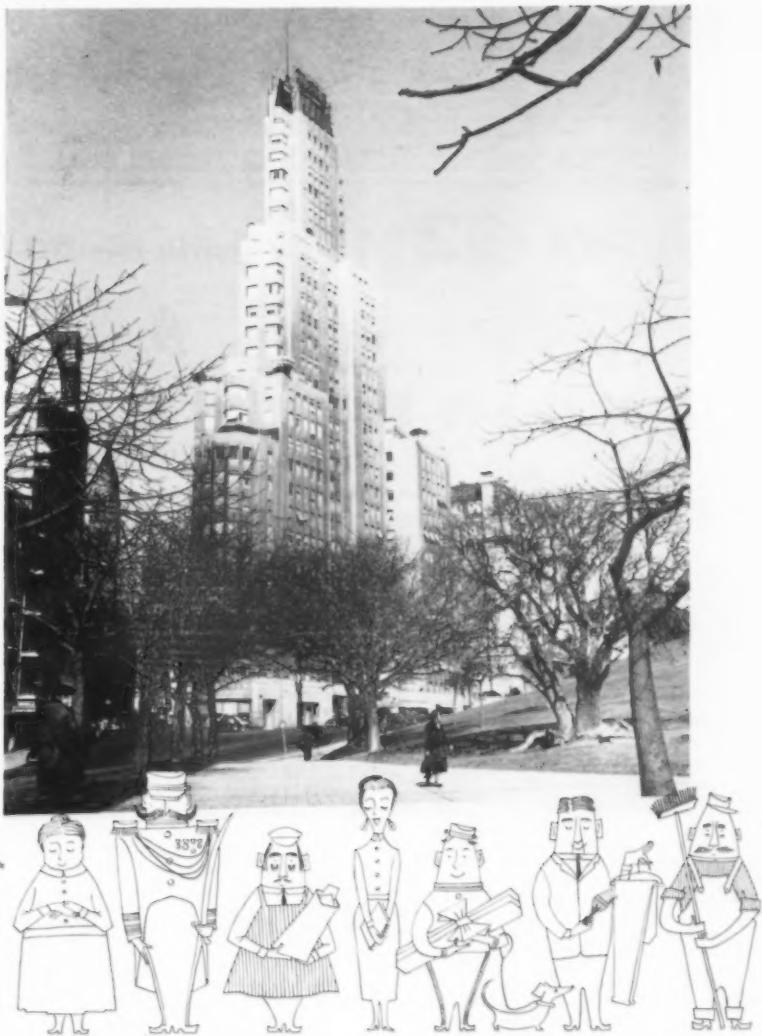
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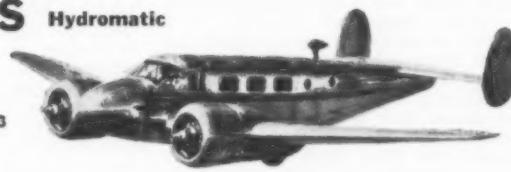
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WAYNE W. PARRISH

Susten Pass. Switzerland is the sort of country where you can be eating lunch and somebody will suggest driving over a mountain pass on the other side of the country, and you do it.

Max Virchaux, Swissair's director of public relations, took me through the company shops at Kloten Airport at Zurich one morning last August and then we had lunch in the fine dining room of the new terminal and Max asked me if I had ever been over the Susten Pass. I said no. He said, let's go this afternoon. I knew enough about geography to know that Susten Pass was down in the center of Switzerland and not just on the other side of Kloten Airport. I said it seemed impossible. Max said it was easy.

So after lunch we squeezed into Max's new little Volkswagen, that most amazing German car and probably the best car buy for the price and quality in the world, and putt-putted out of Zurich to Zug and along those beautiful lakes east of Lucerne and on to Altdorf and on up the narrow valleys to Wasen.

This is where the railway loops several times inside the mountains and the trains appear and disappear on a series of levels as they get altitude for the St. Gotthard railroad tunnel leading into the Italian part of Switzerland and on into Italy. Wasen is also the place where you can put your car on a railroad flat car and have it shipped through the Alps when the highway pass is closed or if you are tired of driving up into the snow and cold.

Into the Snow. Of course Max and I didn't go south of Wasen, we turned west over the Susten Pass, which is the only new mountain pass in the country. It was constructed during World War II as a defense measure and it is an absolute masterpiece of highway construction. No road had existed through there before. It is so well graded that Max's Volkswagen made it to the top, about 7,000 feet, without changing gears. This little car can't get overheated because it needs no water; the engine is aircooled.

It was a magnificent drive up above the timber line into the snow and then into a dense cloud bank hugging the western side. We came out from under into one of those dreamland pastoral valleys for which Switzerland is famous. When we reached the bottom of the valley we had some hot chocolate and pastry.

By the time we reached Lucerne it was dark, but we were back in Zurich

by 8 o'clock. All I can say is that everywhere in Switzerland is quite easily accessible in a matter of hours, and if you base somewhere in the center you can have an awful lot of fun and see a lot of spectacular scenery with a minimum of effort. I can recommend a Volkswagen for Swiss highway travel. A big American car (and they all seem big by comparison with the European makes), is a nuisance on those mountain highways, plus being very costly to operate.

Swiss Hospitality. The rest of my stay in Zurich was all wound up with the festivities surrounding the airport terminal dedication. Never have I seen such meticulous, elaborate and orderly preparations for visitors. The hospitality was quite overwhelming. Fancy luncheons and even fancier dinners. On one night there was a big dress ball in the airport terminal with a half-dozen orchestras and—well, no airport in the U. S. has ever come within a thousand miles of matching the Zurich opening.

Imagine, for example, that each invited visitor (and they came from all over Europe, U. S. A., etc.) was given a booklet of certificates good for taxis anywhere in Zurich. Just call a taxi, sign the coupon at the destination, and that was it. I had eight or so coupons unused when I left. When Zurich says you're an honored guest they really mean it down to the last taxi ride.

At the big ball at the terminal they had some sideshows in progress and Fred Glass, The Old Baldy who runs aviation for the New York Port Authority, and is currently president of the Wings Club, challenged me to a

dart game. While a crowd of 600 looked on, Old Baldy did his best to sink me. But champagne can often sharpen skills as well as spirits and I was happy to say that I beat Old Baldy and collected a prize. The moral is that it never pays to give the New York Port Authority an edge on anything; it is I feel lucky to be alive. Old Baldy was missing the target so wide I expected to find a dart landing in me instead of on the board.

Bells and Food. Zurich put on a very fine air show on Sunday afternoon and it seemed to me that every citizen of Switzerland and half of those in neighboring countries came out to see it. The crowd was enormous. The civic pride in the new airport was a wonder to behold.

If you stay in Zurich long you become well aware of church bells. They seem to ring out at the slightest provocation . . . Near the Dolder Grand is a big piscine—swimming pool to be noted for its waves. Some mechanical apparatus whips up some really big waves at intervals, a good substitute for the ocean beaches far away from Switzerland . . . I can recommend most highly the Veltliner-Keller restaurant at 8 Schlüsselgasse in the old section downtown; very good food . . . The Waliser Kanne is a good eating spot, too . . . Zurich is noted for its good food.

Year-End Report. Now to go back to the U. S. A. I am proud to report at this year's end that out of the 510 airports currently being served by scheduled airlines, I have now been to 379, leaving 131 to go.

Just to show you that I mean business in hitting every single scheduled airline airport, I had to go to Denver in September and I got there by going on Capital to Norfolk (where my good friend Bill Lyons runs a fine airport) and taking Piedmont through umpteen stops to Cincinnati, hopping Delta to Chicago, overnighting, and taking a Braniff local to Sioux City, another Braniff local to Omaha, and then hopping on United to Denver. Twenty-two stops in two days! But I hit 12 new airports that way.

I've also made progress on new airports within easy reach of Washington. It was rather embarrassing to check up and find I had hit more airports far away from my own home base than near it. So I had a good flight on Allegheny from Newark as far as Rehoboth Beach, and just lately I flew Allegheny to Buffalo and hit such new stops as Hagerstown, Cumberland, Altoona, Johnstown, Oil City, Bradford and Jamestown.

So far I have been on two new local carriers in the past few months—Allegheny and Piedmont—and found them both good.

But how I hate those juke boxes at some airports! Take Roanoke, Va. for example, where I laid over for connections. The coffee shop was stuffy, smoky, hot, lousy with flies, and the juke box screeched to high heaven.

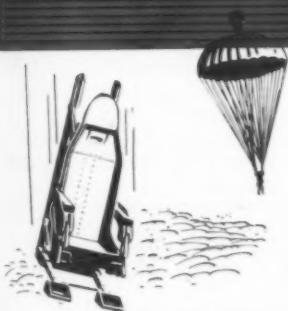
Incidentally, in addition to visiting with Bill Lyons at Norfolk, Va., I had a good visit with R. V. Wolf, manager of the airport at Sioux City, Iowa, who was getting close to moving into an attractive new terminal when I was there in September.



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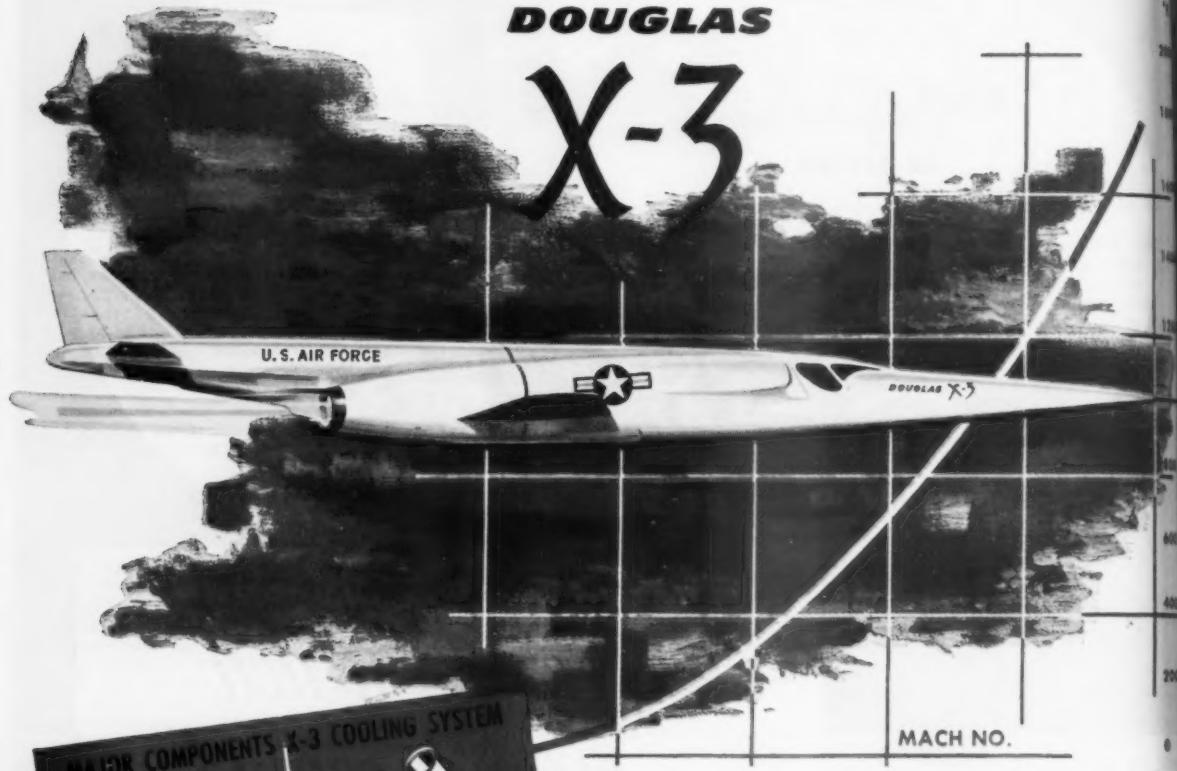
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The Washington View

New Champion for the USAF

Rep. John Taber (R., N. Y.), the economy-minded chairman of the vital House Appropriations Committee, has come out in full accord with the Administration's plan to strengthen the Air Force next year. Moreover, he said the Air Force must have more money next year and Congress will have to vote the funds in the upcoming budget. With the weight of his words carry, Rep. Taber becomes the new champion in the Air Force's growing circle of Capitol Hill supporters.

Thus the Air Force should see easy sailing this year with Congress, which will be a reversal from the stormy scenes it suffered through last session. This also represents a switch in position for Rep. Taber. Less than a year ago he was in the thick of the fight to cut back the current Air Force budget some \$5 billion from that proposed by former President Truman. Taber not only pushed for the Eisenhower Administration's cuts, he even made more of his own.

Rep. Taber's position today, however, does not represent any change in character, nor does it lessen by one jot his consistent efforts to further reduce overall government spending. He coupled his call for increasing the Air Force appropriations with an additional demand that at least \$5 billion be slashed from the Federal budget in fiscal 1955.

To what figure the Air Force budget should be raised, Taber has not said. It currently is \$11,168,000,000. Taber apparently wants to wait until the President sends his budget to Congress.

Who Carries Military Mail

Top level government consideration, including both the executive and legislative branches, is being given to the controversial problem of whether to continue sending overseas military mail (APO) via the scheduled airlines or to permit its shipment on large irregular air carriers.

Sen. John Bricker (R., O.), who heads the Senate Commerce Committee, has, meanwhile, quietly taken the initiative away from the junior senator from Massachusetts, John Kennedy, who publicly charged the Defense Department with wasteful practices in handling

APO mail by air. Kennedy said Defense was "wasting" \$8000 daily by using the scheduled airlines' services at 85¢ a ton-mile instead of a 25¢ rate offered by an irregular carrier.

Immediately following Senator Kennedy's charges, CAB chairman Oswald Ryan was asked to hold an explanatory meeting which was attended by officials of the Post Office, Commerce, and Defense Departments as well as some from the Budget Bureau.

A number of major points were reported as "clarified" to the satisfaction of those present. The scheduled airlines were, in turn, reassured that they will continue to carry APO mail at service rates prescribed for them by the CAB.

At the heart of the problem, which was in the process of being resolved by the Administration before Senator Kennedy entered the picture, has been the question of which agency, P. O., Defense, or CAB, is to pay the airlines for APO mail.

In effect the money still comes out of the same barrel, for the total air mail funds have been appropriated, and it only depends upon whether the charge is against service or subsidy. On the other hand, it was pointed out, if a non-certified carrier was contracted with even at 25¢ the total cost would be over and above air mail funds already appropriated.

Thirty Million Federal Dollars

CAA's Office of Airports believes in being prepared for any eventuality. It has gone at it this time in a big way. It is reported to have mapped out a \$30,000,000 Federal-aid airport program for fiscal 1955.

At the moment it is unknown whether such an item will be carried in CAA's new budget, but it is a case of having a program ready in the event that aid is restored by Congress. Many aviation organizations have gone on record as favoring future Federal aid on a more restrictive basis than heretofore.

Chan Gurney To Head CAB

As this issue went to press the White House was expected to announce the appointment of CAB member Chan Gurney as Board chairman for 1954. At the same time Harmar D. Denny is to be reappointed to a new full six-year membership and redesignated as vice chairman of the Board.

Gurney is slated to replace Oswald Ryan as chairman. Ryan expects to serve out his remaining year as a member. Gurney still has five years to serve on the Board.

All three of the Board members involved in changes are Republicans. Less than two weeks ago they met at the White House with Presidential aide Sherman Adams, at which time it was understood the CAB chairmanship and individual memberships were discussed.

... PREBLE STAVER

News at Deadline

North American Reports Net of \$12.8 Million

A net income of \$12.8 million on sales of \$635 million has been reported by North American Aviation for the fiscal year ended Sept. 30. The figure, which amounts to \$3.72 per share, comes close to doubling the total for fiscal 1952, which was \$7.8 million, or \$2.28 per share.

Earnings before taxes went from \$20.3 million in fiscal '52 to \$40.1 million, but income and excess profits taxes more than kept pace (\$12.5 million to \$27.3 million).

CAB Starts Industry Mail Rate Study

The CAB, motivated by the Post Office Department's new policy to ship mail via the lowest rate carriers, took these actions late last month:

- Advanced National Airlines and Northwest Airlines from Group II class of airlines to Group I, with a resulting decrease in service mail rate from 53¢ to 45¢ per ton-mile;

- Directed the other four Group II carriers—Braniff, Delta-C&S, Capital, and Western—to show cause why they should not be paid 45¢ on competitive segments affected by the new PO policy and higher rates on non-competitive segments to produce an average rate of 53¢ per ton-mile;

- Instituted an investigation into the mail structures of all 13 domestic trunk airlines.

Sikorsky Engineer Sees Piston Development Need

Reciprocating engines developed along the lines of the Turbocompound may hold promise for helicopters, in the opinion of E. F. Katzenberger, design engineer of the Sikorsky Aircraft Division.

Addressing a regional meeting of the American Helicopter Society, Katzenberger noted that he was not suggesting that programs of turbine engine development be reduced, but only that some consideration be given to developing higher power or lower specific weight in present reciprocating engines.

The development problem, he predicted, would be "only a fraction" of that required to develop an adequate turbine engine.

Two Hughes Firms Incorporated in Del.

Incorporation papers for two Howard Hughes organizations have been filed in the office of the Secretary of State in Dover, Delaware.

One of the new corporations is Hughes Aircraft Co., which until now has been a division of the Hughes Tool Co. The other is the Howard Hughes Medical Institute. The former was registered as having 75,000 shares of no-par value; the latter was registered as a non-stock company.

Speculation is that the move, for which no official explanation is yet available, may herald a reduction of Hughes' holdings in TWA, which now total over 70%. The aircraft incorporation may also reflect recent organizational difficulties which led to the departure of several of Hughes' top officials.

Incorporators of both new firms were listed as Francis J. O'Hara, Jr., a Washington, D. C., attorney; S. M. Brown, of Wilmington, Del.; and A. D. Atwell, of Town's End, Del. The latter two were identified as employees of the Delaware agent.

Titanium Production Committee To Be Named

A top-level committee will shortly be appointed to study the titanium situation, according to Defense Mobilizer Arthur S. Flemming. The group would make recommendations in 90-120 days on how much to expand production.

In the meantime Flemming has authorized the General Services Administration to negotiate contracts as quickly as possible to meet the present 25,000-ton-per-year capacity.

North American Plans Mach 3.5 Wind Tunnel

A new wind tunnel capable of speeds up to Mach 3.5 is planned by North American Aviation. The facility, which will cost \$4 million, will probably be built in El Segundo, Calif. It will be designed for intermittent tests through the use of a pressure build-up and blowdown system, which is more economical to build and operate than continuous flow types.

Costs Climb Faster Than Revenues: ATA

Expenses rose faster than income for domestic trunklines and local air carriers, according to a year-end estimate by the Air Transport Association. The international carriers came through the year in better shape, according to the ATA's figures, registering an operating income that was up 108%. Adjustments may modify all total ATA noted.

Trunks increased their passenger mileage 17.8%, revenues 14%, and operating expenses 16.4%. Local lines increased passenger mileage 17.3%, revenues 13.7%, and operating expenses 15.9%. International passenger mileage rose 11.16%, revenues 7.62%, and operating expenses only 3.06%.

No NWA-Pan Am Merge Contemplated: Harris

Story of a possible merger between Northwest Airlines and Pan American World Airways, which had appeared in *Aviation Week*, has been branded "completely false" by Harold R. Harris, NWA president.

"I have asked each member of the executive committee of the board of directors," wrote Harris in a letter to employees, "whether they had any knowledge of any move in that direction. This rumor was just as new and unknown to them as it was to me."

World Airlines Carry 52 Million Passengers

Year-end figures released by the International Civil Aviation Organization show that the world's airlines carried more than 50 million passengers during 1953, for the first time in history. Passengers carried (52 million) and passenger mileage flown (28.6 million) were both up 16% over totals for 1952. There was a 10% increase in miles flown, for a total of 1.2 billion.

During the coming year the world's scheduled airlines can look forward to a 10% increase in traffic, according to Sir William Hildred, director-general of IATA, International Air Transport Assn., and will probably put into operation 300 new aircraft.

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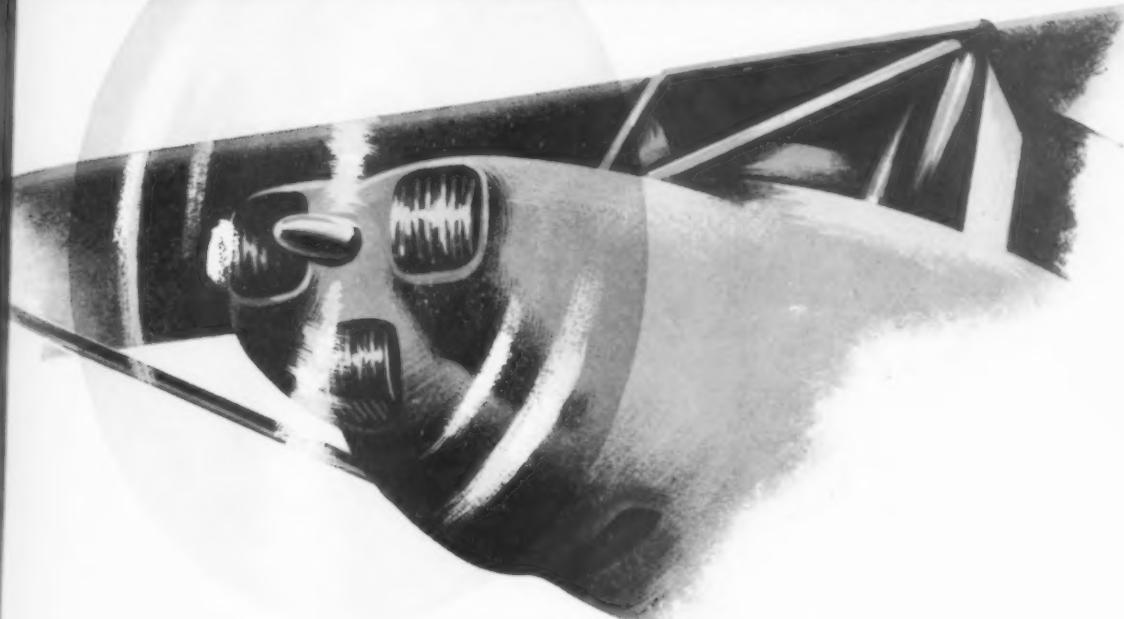
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Chance Vought puts the Navy in the Air 1917-1954



CHANCE M. VOUGHT, as one of the early Wright pilots, began flying in 1910. He was a protege of Orville Wright and is shown here in one of the earliest Wright planes, in which he learned to fly. As he pursued the field of aeronautics, Chance Vought became one of the country's top-ranking airplane designers and builders.

The name Chance Vought—a leader in the aircraft industry since 1917—has been synonymous with Naval Aviation for decades! The Navy's first aircraft carrier was equipped with Chance Vought VE-9's; a Chance Vought airplane was the first to be accepted by the Navy for regular service aboard battleships and cruisers; and Chance Vought was the first to produce a successful float monoplane for catapult operation. Photo below shows one of the early Vought seaplanes being launched from the U. S. S. Oklahoma.



THE F7U-3 CUTLASS, the Navy's new swept wing jet, produced by Chance Vought, was designed as a high-performance, hard-hitting carrier-based fighter.

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